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BAKING TECHNOLOGY

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in Baking*



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No. 1

New Work Now Under Way

TO you, Mr. Bakerman, as you dig into your winter work, here are things to give you pause. You come from a past of service in which problems of the dough trough absorbed you. Now people are working for you that you never recognized as friends nor foes before. Even on a frosty January morning it will pay you to take one look around. You find that out in Sunny California the headquarters of American Bakers Association has been temporarily set up. When the bakers there decided to spend a January week "glorifying bread and wheat products" famous men came forth to help

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them. They were famous men who understood that wheat-foods are man's best foods and that they have reasons to be interested, entirely apart from commercial considerations. At the same time, on the west coast bakers were finding the electrical men, the butter men, the milk men, the jam men, ready to help them stage a great toast and toaster campaign. All know that behind the use of toast is the sale

of a toaster and behind the sale of the toaster is the increased use of bread and all the spreads that go to make bread a dainty base for a meal. If any baker still lacks faith that cooperative effort is the

REMOTE STORAGE

need of the hour, let him take note of what William H. Ireland and his associates are doing in Southern California. Dr. H. E. Barnard is there to tell what that movement means to the National work of the baking industry as a whole

At the same identical moment, on the east coast, Dr. Eddy comes out with plans to increase the use of the white loaf of bread in American diet, and announces his plans as part of the work in nutrition of Columbia University. His east coast work, at Columbia, rivals in nature and service the west-coast work of Dr. Alonzo Taylor of the Food Research Institute of Stanford University. One had charge of seeing that nutritional qualities were kept in the food for soldiers during the World War; the other had charge of feeding Belgians and Central Europe's starving children for the Food Administration.

While these bits of major help from the outside are being delivered for the baking industry's benefit, Harrison Fuller, for the Wheat Council of the United States, announces plans to put on toast and toaster campaigns, as a means of making wheat foods more available in the home, in nearly 150 American cities. The drive seems only beginning at that. These American cities cover all corners of the country but the gaps between, it is indicated, will be filled by toast campaigns, as the success of one campaign leads hopefully up to another.

In New England the Hartford Courant issued on January 13 a complete "Eat It With Toast" section of that newspaper. It was unprecedented in its service to wheat foods. There were fourteen pages in all devoted to wheat foods and their use. The very advertisements rang with new message of cooperative service to "glorify the product and forget the brand."

A mere glance at the list of advertisers who joined to make this great section

carry its story of toasted wheat foods, is a liberal education to the baker or allied tradesman who may be figuring on a toast campaign for his own neighborhood. Therefore a brief study of these advertisements is here set forth.

On the front page is a graceful photograph to start the section off right. It is a photograph of a beautiful young housewife serving breakfast, with her electric coffee percolator at one hand and an electric toaster at the other hand. She is offering her helpmeet a plate of toast, well spread with butter and jam. Then comes a fac-simile of a letter from President Coolidge to Hon. Sydney Anderson, head of the Wheat Council of the United States. The President tells how he is impressed by the Wheat Council's work, and of the great service to America it can perform by getting our wheat surplus into consumption.

The second page presents the picture of Mrs. Wilbur F. Fribley, who has taken hold as chairman of the Home Economics Section of the Illinois Federation of Women's Clubs, to teach them that they owe it to wheat producers "to reverse English on the war and restore wheat foods to their previous position of importance."

Many Advertisers

It is here that the advertisers take hold. A quarter page advertisement glorifies toast, asking only that it be served "crisp and brown with every meal." Who would pay for such advertisement? It turns out to be the work of an egg dealer. He wishes to assure housewives who will serve his brand of eggs on toast, poached, that they will have no regrets. This ties the egg producers in with the toast campaign. No wonder—who ever saw poached eggs or toast served or eaten alone?

Then there is another advertisement telling about toast. And it adds that a de-

licious covering for toast is dried beef. A dried beef company paid for that advertisement, the Chamberlain Co., specializing in "New England cured dried beef."

A Milk Toast Ad.

A full page advertisement, one of half a dozen in the section, tells about toast, and specialized on milk toast and toast made from milk bread. It pictures cows, milkmaids, and bread loaves. Who would pay for that? It comes from Bryand and Chapman, milk dealers. It names no man's brand of milk, no brand of toast, both products are glorified when used together, as toast and dried beef and toast and eggs are on a previous page. Thus we have eggs, beef, and milk tied into a Wheat foods campaign.

From milk toast we turn over a Hartford Courant page to gas and toast. Here is a story of toast and toasters, 400 of which will be given away every week during the toast campaign. Who pays? The signature to the half page advertisement is that of the Hartford City Gas Light Co. It does in Hartford what the Peoples Gas Light Co. did in Chicago. It ties into the campaign with its full heart and selling energy. Even a restaurant joins—it tells you to come to the Ningpo Restaurant and enjoy some splendid toast dishes that will convince "both you and your wife that home-cooking can be duplicated in the restaurant at a great saving of the young wife's strength."

The Trumbell Market sells wheat foods of all kinds suitable to serve in toasted form. It joins the "Toast Campaign" with a quarter page advertisement telling about Aunt Betty Bread, Aunt Lou's Pantry Cake, Danish Pastry, Covered Pies, and Our Famous Pound Cake. Here is the little baker's tie-up with the campaign. It is heartening to see it because the old cry of "wolf" was raised by some

doubtful bakers when the Toast Campaign was first brought forward as a means for initial cooperation for all who have their goods hauled to market on a sheaf of wheat. Some little bakers cried that the toast campaign was just a device for substituting bread for sweet goods. It was never anything of the kind. Sweet goods, toasted, have a direct part in the campaign and their virtue is so great that many are preferring toasted sweet rolls to toasted bread. Here was a small baker who so believed and so advertised.

Bread Company's Aid

"Buy Bamby Bread" brought a baker, the Royal Baking Co., into the field in a way to show that bread can do its part with the other. The Royal Baking Co. tells its patrons that it uses only fine creamery butter for shortening, and that the fine flavor of the butter comes through into the toast, so that it is a specially fine bread for toasting.

The New England Baking Co. asked the housewives to contribute their formulas towards the making of the New England Bread. It tells them the result in half a page advertisement which again reciprocates with other industries. For it shows toast from New England bread being served with milk, after being made electrically. It also shows crab meat toast, cheese toast, French toast, and Dream toast.

Electric Men Help

Not to be outdone by the gas men the electric light company, the Hartford Electric Co., sings its song of "do it with electricity." It shows a fine electric toaster and shows how the bread coupons are worth \$2.05 each. These coupons are far different from the evil premium habit of some communities. One is wrapped with nearly every baker's loaf and the electric store redeems them all, regardless of the

name of the baker from whom the coupon is obtained. Thus all bakers serve to put the thought of "toaster" into the mind of the housewife as a preface to getting her to think of toast and its many household uses.

Many Bakers, six on a single page, contribute their bit to "glorifying the product" in this remarkable supplement and with their advertisement appear the splendid articles about Toast furnished by the Wheat Council, and by the American Institute of Baking. The big men of the movement, from Grosvenor Dawe to Dr. L. A. Rumsey of the American Institute, in charge of toast research work, are interviewed and their stories of what toast ought to be, and what it will do to help carry the farmer's burden, are given conspicuous space.

Eventually—on Back Page

And then comes one of the most satisfying advertisements in the whole of the sixteen Hartford Courant pages. It is the full page advertisement on the back page. Bakers can never overestimate the good to the baking industry that must follow such National advertising as that done on the back page of the Saturday Evening Post by the Washburn-Crosby Co., or that done on a page of the Saturday Evening Post to glorify raisin bread, by the Sunmaid Raisin Co. Here again, one of the pioneer cooperators in the Eat More Wheat campaign proved that it could reach a helping hand into New England, as well as to advertise for the country as a whole. "Eventually" the back page advertisement of the Courant read, "you will learn to like cinnamon toast, snow-flake toast, asparagus on toast, club sandwich, baked eggs on toast, and after-the-theater cheese toast sandwiches."

Time was when the Fleischmann company alone bore the burden of National

advertising to glorify the baker's product. Now a family of cooperators join in that movement.

How to Organize

MANY communities are experimenting with toast campaigns where local committees lack experience in getting just the kind of cooperation that is most needed. Sometimes the gas or electric companies, in the midst of other occupations, fail to see the kind of cooperation that is called for. National leaders in those industries see the need, so if the local committee finds any trouble it is best to notify the Wheat Council. Then efforts will be made to obtain the cooperation. Some local committees have gone ahead without it and have lacked a valuable factor in the cooperating groups.

"Their broad contact in the community," suggests Grosvenor Dawe as a result of his experience in organizing many New England towns, "makes them the solid foundation of a campaign. After the electrical and gas men have been brought into the movement, the next most important groups are the wholesale bakers, the retail bakers, and the yeast men. Wholesale bakers together contact with practically all grocers, while retail bakers reach their own particular clientele daily. The yeast companies reach retail bakers and grocers both. These groups, taken jointly, make it possible to reach the public through the medium of bills sent into the home for gas and electricity, through wagon banners and store windows cards.

"When groups can organize more broadly it pays to do so. The next groups to bring in are the meat stores, the hotels, the restaurants, the leaders in domestic science, and home economics. These groups reach the public mind directly with

the idea. They are intelligent persons and realize that the baker is only one step, and an unavoidable step, in the progress of wheat from farmer to consumer. So that they will not resent the so-called "commercial interest" as if this interest was not one of great potentialities for social service as well.

"In one case the fine cooperative spirit of the electric companies was shown by a coupon arrangement, amounting to a reduction of \$2.05 in the price of the toaster. Then the company advertised on its bill that it would give the purchaser five months in which to complete payments. This greatly stimulated sales. Agreements had to be made between five different factors, including manufacturers, jobbers, credit men and retailers, before this method of merchandising could be put into effect.

"If put on in this manner the Toast Campaign will tie together, with the Wheat Council of the United States as the center of the movement, a number of interests who always heretofore considered their own interests were separate and diversified, and not jointly of consequence one to another. The movement turns "all the power of windows, wagons, advertisings, and house approach in a single direction, centered upon a commodity that is in use every day in every way in every household."

Regional drives, as the one now in progress in New England, or the one being worked up in Pittsburgh district, or the one being planned in Texas by Houston bakers, are preferred to any attempt at a single "nation-wide campaign." So far as reported such regional campaigns are in process or are being planned, in Omaha, in Oregon, in Muskogee, Okla., in Ravenna, Nebraska, and in Michigan, in addition to those in Pittsburgh, Houston, and New England.

Raisin Research

ONE of the interesting activities of the American Institute of Baking is that having to do with research into the best ways to mix with bread the various other foods for which it can serve as a carrier.

When it was desired to find out what was wrong with modern toast, what made it so different from the well-flavored toast of grandfather's day, Dr. L. A. Rumsey required very little time to give the answer. He learned by tests that we had made a huge blunder in applying the modern heats such as electricity and gas, to the surface of bread. Grandfather's toast was mostly made at an open fireplace, along with the pop-corn and parched corn. The heat was applied slowly. Gas and electric heat had not been applied slowly. It had aimed at instantaneous toast, or flash toast. The result was not toast, but ashes and a charred surface where a golden, brown, caramelized surface should be.

Through this discovery, as simple as it is when you think of it, the American Institute started toast over again as a dainty and fragrant factor of the daily diet. Electric and gas toasters were slowed up to give the result of the old open fireplace. We thus learned a little more about the principle of applying modern heating devices to old friends among the foods.

As with toast, so it is with the use of raisins in bread, with the use of figs in bread, and with the use of nuts and other ingredients. Each added ingredient needs special study.

When the fig growers of California decided that figs should be placed in bread, they perfected first a machine to cut figs into raisin-size pieces. Then they applied to the American Institute of Baking to study for them the best way to make fig bread. It was easy to make blunders, for the figs were rich in simple sugar and

that upset all formulas made for figless bread.

The Sunmaid Raisin Co. applied similarly to the American Institute for aid. They established a fellowship at the Institute, one of the first of what may become a considerable group. At their request, Charles F. Rudmann, Ph. D., was assigned to the task of studying raisins as a bread ingredient. For many months he baked loaves of bread using raisins in many different proportions. He studied the fermentation problem and devised formulas for raisin bread. These were distributed to bakers so that they would not have to lose time with failures in their own shops.

Bakers' Experience

In the meantime many bakers were putting out raisin loaves. What were their experiences?

Had they found that the trade preferred a dark loaf of raisin bread to a white loaf?

Some types of raisins had a tendency to sink through the dough as fermentation process advanced, and to leave brown streaks, like comet's tails, above them in the finished loaf. Did the buyers of raisin bread object to this brown streak, so that it must be eliminated before customers would be satisfied?

Dr. Rudmann wished to get the experience of the bakers in merchandising raisin bread on these and many other points. To help him an Institute questionnaire was prepared and sent to a large number of bakers. Replies were disappointing in number, for bakers have not yet sufficiently learned that a service that may seem like a personal bother often helps to build the whole industry. Just as many neglected the questions of the Food Research Institute, which started a very extensive survey of the baker's delivery

problem, so they neglected the raisin questionnaire.

But about forty bakers answered the questions. Anyone who is reminded by this article of any experience with raisin bread that might benefit the Institute or the industry as a whole, is invited to send it in at once.

Out of the forty who answered questions, a majority reported that they had found raisin bread profitable and popular with the public. But eight reported that it was a bother to make it up, while two of these insisted raisins were too high to make raisin bread profitable.

Increased Sales

Twenty-three out of the forty reported that raisins increased their business, as people bought their usual quota of white bread, while new customers were attracted by the raisin loaves. But eight bakers took a different view, stating that in their opinion their raisin loaf sales took away from their regular sales.

Bakers differed a great deal as to the amount of raisins they were using for a "raisin loaf." Some put in three or four ounces of raisins and some only three or four raisins, counting the number by the raisins instead of the ounce. Those using the larger number of raisins reported that such a loaf easily commanded a higher price and satisfied the purchaser who had paid this price.

More Answers Sought

The reports showed that white bread sold best, but there seemed to be a growing demand for dark bread with raisins. Most bakers using the larger types of raisins reported the presence of a stain, but those using baker's seeded raisins found little to complain about in this matter.

The percentage of raisins used varied

from one per cent to 55 per cent, although a majority used about 33 per cent.

Bakers seemed to be settling on the Thompson type and the Bakers Seedless type as the favorites, although 80 per cent of those answering questions reported they found no difficulty at all in getting any type of raisin they preferred, and had made their choice without reference to salesman advice.

It is hoped to continue this inquiry and to prepare data from a much larger group of bakers than have so far turned in their answers.

Results That Count

TO one in the midst of great strivings, if often seems strange how people who know nothing of what is being done presume that they have a full right and ability, without investigation, to pass judgment. And such judgments usually concede nothing of credit or good heart to the enterprise they feel so sure about.

When the Wheat Council of the United States was first formed we could hear from prophets on all sides that would "not last three months because it was organized to elect Gov. Preus of Minnesota to the senate and as soon as Magnus Johnson had been elected it was done for."

The three months have gone by and three more have followed them. There just comes to hand the American Miller for January with one of the finest write-ups of the Wheat Council and its work and plans we have yet seen.

It is written by Sewell Peaslee Wright, and carries the significant headline: "Tie Up With the Toast Campaign." It prints in box form five small advertising cards that can be reproduced and inserted in grocery store windows. It tells how toast-

ers can increase the use of toast and toast can increase the sale of flour.

With this article comes another cheering bit of news. The largest dealers in electric toasters in Chicago reports that his company sold ten toasters this Christmas to one it ever sold during a previous Christmas season. This shows how co-operative efforts has worked out. Bakers did most of the talking that made the toasters sell. They will reap their reward in the form of more bread sold. Millers did splendid work in putting in the Saturday Evening Post advertisements costing many thousands of dollars, and in putting on the bill boards pictures of toasted bread with splendid appetite appeal. They will get their reward in increased flour sales. Farmers will feel the work in the form of a stronger pull on their wheat surplus and an opportunity to turn wheat into the cash that keeps the farm alive.

A Test By Weight

We have heard much of the weight of bread as a subject for controversy. But bread weighing was probably never before put to the unique service to which it was applied during a test of quality baking in Omaha. Mr. Petersen, of the Peterson-Pegau company, delivered bread free to a select number of customers for three weeks. All he asked was that all unused bread be kept for their deliveryman and turned over to him upon request.

The returned bread was duly weighed. Mr. Petersen found just what Henry Stude found by a similar test in Houston, Texas. The weight of the returned bread varied in exact proportion to the quality of the loaves sent out. Of the loaves of best quality 70 per cent more went into consumption than of the loaves of poor or average quality.

Bakery Managers To Meet

*Call Is Issued For Conference In March To Organize A New Section
Within American Bakers Association*

Locked away between four bakery walls, buried in work day and night, and always subject to call when trouble strikes the plant, the Bakery Production Manager, is the "key man" in the successful modern bakery. He gets most of the blame when things go wrong, and very little praise. How can he broaden his contacts and his view point? American Bakers Association has decided to make for him a day of his own. On March 17 bakery production managers will be welcomed to the American Institute of Baking for what is hoped will be the first of a continuous series of annual conferences. His stock in trade is **QUALITY** and if the production manager falls down on that the advertising man's story falls down, and the route salesman's experiences cease to make him happy. The meeting at the Institute will not be a convention, but a conference—on every problem the Production Manager has to face. The story below tells why this conference was called, and what it hopes to accomplish.

ON March 17, 18, and 19 of this year, there will meet at the American Institute of Baking, 1135 Fullerton Avenue, Chicago, a group of men who are most important factors in the success of the modern baking industry. They will meet to make themselves more efficient, and from this meeting may come a flow of better bread through the ovens of bakers in all parts of America.

The men who are to meet are the bakery superintendents, the bakery production managers. They will not only consult together for three days on all the problems that production managers have to face but they will form at this meeting a new section of American Bakers Association.

Thus in an important field of baking progress, there will come an end to the old time-worn principle of silence and secrecy, and a sharing of knowledge that will help to make participating individuals better production managers, and will at the same time help to elevate the industry as a whole.

A tentative program has been sketched for this meeting. It does not call for speeches and dreary papers. It calls for the taking up of each problem the bakery production managers faces in his own

bakery. If it has been keeping each one of the production managers in attendance awake of nights, it is possible that some one of those present has found a solution to the problem. He can trade his special knowledge for special knowledge of another kind that some other manager may have brought to the conference. Methods as yet are far from standardized.

The decision to call this special meeting, and organize this special new section of American Bakers Association, was arrived at by the Institute Committee of American Bakers Association after very careful consideration. It was felt two years ago that such a branch of the American association would be needed in time. At bakers conventions, if the men present were mostly production men, absorbed in bread baking problems, they did not take the alert interest in papers on merchandising that the bakery owners took. It was seen that production was becoming a specialized task, while merchandising the finished product was becoming another kind of a task, each with a specialist in charge. Bakers' conventions more and more attracted the bakery merchandisers and left the production man and his problems out of the general convention programs.

The result was a growing conviction that the production manager must have his own conferences—with his own kind of people,—all interested in common with the problems of bakery losses, bakery qualities, bakery ingredients. The matter was discussed at the French Lick convention, it was taken up again by the Institute Committee and the Board of Governors, and a call for a first meeting was decided upon, the meeting to begin on Monday morning, March 17.

Program for Meet

A tentative program only was sketched, as it was believed that once production managers came together they would, after completing their organization, find plenty of things to discuss without making a hard-and-fast program in advance. The Institute found it had available a room seating 100 persons. If more superintendents than that number should respond, it was found that other rooms could be made available.

It was decided to throw open the invitation to all members of American Bakers Association and non-members alike, and not to seek to limit the conference by any narrow rules. All bakers attending the meeting of the Board of Governors at which the call was decided upon, agreed that they would themselves consider the expenses of sending their production managers to the conference as an investment and not an outlay made without hope of return. They stated that they believed other progressive bakers would take the same view of the matter and would send their production managers as a matter of good business policy.

Organization First

The first work to be taken up after the call to order on Monday, March 17, will be that of forming a permanent organization, as a section of American Bakers

Association. A chairman and secretary will be elected. It was suggested that the secretary be chosen from the Institute staff, so that the routine work of his office can be always available for Institute information, and in order that clerical help may be at hand for him.

After organizing, the next task will be to divide the program into several definite parts. The details of this plan are given here for the special benefit of bakers who wish to make up their minds whether or not to send their production manager, and for production managers who may wish to attend.

Factors of Control

The first subject for discussion will have for its leader Thomas E. King, of Chicago, who is auditor and controller of the Livingston Baking Co. Mr. King will lead a discussion of "Factors of Shop Control." He will deal especially with those factors of control for which the bakery superintendent must be personally responsible.

These factors include:

1. Invisible losses, or losses representing the difference between material on hand and material shown to be on hand by a previous inventory, less the material accounted for as having been used.
 2. Absorption.
 3. Evaporation during fermentation.
 4. Loss or gain in scaling.
 5. Dough cripples.
 6. Shop cripples.
 7. Burned cripples.
 8. Oven cripples.
 9. Production over and above consumption.
 10. Quantity of dusting flour used.
 11. Oven fuel economy or lack of it in its use.
 12. Production per man per hour.
- The discussion on control factors, it is

thought, will consume the first day's session.

Materials and Formulas

For the second day's program the opening discussion will be on materials and formulas, with William Walmsley, of the School of Baking, American Institute of Baking, as leader.

One production manager who will attend the conference discussed this field for the benefit of those who may attend.

"Can a production manager," he suggested, "get the best results if the bakery owner has a purchasing agent other than the manager, who may force the manager to use ingredients other than those he would himself purchase?"

"Should a production manager command the resources of a laboratory at which ingredients are tested and all variations in quality or character of a product determined before the product gets into production in the bakery and affects a large number of loaves?"

"Can a production manager go on under the old rule-of-thumb methods, buying by brand and using ingredients without knowing in advance their exact method of behavior?"

"Since it is known that flour of the same brand from the same mill will vary with the source of the wheat and the kind of weather during the growing season, should the production manager remain constantly on the alert to change his formulas as guided by baking tests on any given lot of flour?"

Production Problems

"Should a production manager buy on price, or consent to purchases on price consideration, when a product costing more is known to him to return greater value in loaf quality?"

For Tuesday afternoon the subject suggested is "Production." Richard Wahl,

production manager of Regan Bros., of Minneapolis, has been asked to lead the discussion on this subject.

It is well known that the bakery production manager's problem is a very difficult one, since he can not manufacture in advance and sell his product from a warehouse, but must keep the production going on all the time, with a high pressure always existing for immediate sale of the product before staling.

The result is that if anything goes wrong in the bakery it must be corrected by the production manager, while production goes right on. There can be no stopping, so that the manager must forearm himself against disaster and keep troubles out of production so far as he possibly can. Therefore he must have an insight into the nature of every factor of production.

Has his friend in some other bakery a newer type of equipment? If so, how does it work? Is the production manager, who is confined for many months between the four walls of his plant, and thinking in terms of the problems within these four walls, overlooking any new developments. If so, it is held by those promoting this conference, that an exchange of opinion with his colleagues will freshen his view points, make him aware of what is being done in all other parts of the country, and whatever new factors are entering into the situation.

An Instance

One instance of what a production manager found, will show how the managers expect, at this conference, to work out their problems together. One manager who had received a technical education in baking problems, noticed that the stock room was checking out plenty of butter to make excellent pies and cakes. Yet his examination of the finished product convinced him that an insufficient amount

of butter was being used. He commenced an investigation and found that certain bench hands, who had permission to take loaves of bread home for their families, were hollowing out the loaves and filling their interior space with butter.

Shop Organization

For the topic of "Shop Organization," which will open the discussion on Wednesday morning, the final day of the conference, G. Cullen Thomas, of the Atlas Bakeries, Inc., has been chosen discussion leader. Mr. Thomas will discuss not only shop organization but the general handling of bakery personnel.

Scoring of Bread

Is it possible to devise a way of scoring an ideal loaf? And is human judgment so standardized that the scores of different judges will agree on rating the various points in such a score? O. W. Hall, chief of the Service Laboratory of the American Institute of Baking, will lead in a discussion of this topic, with samples of various loaves as the basis for his talk. A recent experience in bread scoring will be explained as an instance of how far the basic principles of bread scoring have become standardized.

Four different members of the American Institute staff were asked to score a certain loaf of bread. None knew that others were scoring it. They worked on different floors and had no communication one with another, yet their score cards did not vary by half a point. This test was made for a baker who doubted the value of scoring bread since it was a matter of judgment and any man might vary greatly from another."

After the discussion on bread scoring is completed, the rest of the time will be taken in clearing up points raised by the topics presented during the first two and a half days of the conference.

It is expected that these Bakery Management conferences will be held annually. The March date was chosen because it comes half way between the annual conventions and does not conflict with other Association dates.

Scientific Bodies Act

NEVER in the history of baking has there been anything like the interest at present manifested by scientists in the problems of the baker's fermentation rooms, dough troughs and ovens. The 163rd meeting of the Rochester Section, American Chemical Society, devoted its time to a discussion of the chemistry involved in the baking of a loaf of bread.

Dr. H. E. Barnard, Director of the American Institute of Baking, was the guest of honor of the occasion, and his address was the principal feature of the program.

In an invitation to chemists to attend the section meeting, Erle M. Billings, secretary, said:

"The Chemist in bakery production has found an opportunity for the application of chemical principles and chemical processes to an extent little realized by men outside the industry. The subtle changes that take place in panary fermentation as a result of chemical, biological, and physical processes are yet little understood. The whole subject offers a fascinating field for study and great possibilities for improved processes of control."

We want to tell you that we appreciate what American Bakers Association is doing for the bakery business, and we are glad to assist you in any way we can.

—Webben & Zeller, Shelbyville, Indiana.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

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We Work Together

**To win through quality production
and the utilization of scientific research
a welcome for two loaves of wheaten
bread for every one that now finds favor.**

Let's Go

WE have stood under the starlit sky in the crisp cold air while we listened to the joyous New Year greetings of our friends and to the ringing of the bells as they welcomed the New Year and at the same time rang out the Old with all its petty jealousies, misunderstandings and carping criticisms. We have made our usual New Year Resolutions—and broken them. Now, *let's go*. Let's go into 1924 with a faith in our industry as affording us a distinct opportunity to serve mankind and American Bakers Association as the vehicle with which to better that service. But, remembering with St. Paul that "faith without works, is vain," and not forgetting the paving of hell with good intentions, let us discard the vicious saying "Let George do it," and throw ourselves into an active participation in the work of American Bakers Association, so that that "vehicle" may have the necessary power to send it onward in its triumphant course. *Let's Go*.

RAYMOND K. STRITZINGER,
President.

Not so Recent

WHEN so-called dietitians and men of little learning assail white bread, they usually base their assertions on recent vitamin discoveries made by such great authorities as Prof. McCollum of Johns Hopkins University. But really they do not need to consider themselves so new and modern. One of the first men, it appears, who flung the contents of a vitriolic pen against white bread was Juvenal, satirist of Rome. During his life from 60 to 140 A. D. Juvenal accumulated much wrath against the nobles and best livers of his times. He reviled their feastings, and to prove his case, he instanced one food on which they indulged themselves with "selfish satisfaction." It was white bread.

Why should the nobles, he asked, have *white bread*, which was tasty and luxurious, when the common people must content themselves with dark and untasty black breads? It seemed that in those days the art of milling white flour was a closely guarded secret, known only to the mansions of a few of the very rich. Similarly the source of purple dyes was a secret known only to a few and to be "born to the purple" was considered a great privilege.

Now the poorest can obtain white bread, for the secrets of milling have become an open book to all. Similarly any child can buy the rich purple of a King's garment in any corner drug store for a dime. In the test of time the white bread of the kings has become the common food of all, and not the black and bitter breads of the very poor. McCollum repudiates his interpreters in an appeal to be delivered from misquoters, while he notes that milk and butter with white bread make it very nearly a complete food, and Eddy, another great vitamin research authority, notes the well known fact that people as a whole do not care for whole wheat bread, and can obtain the maximum benefits of the bread ration

in white bread, made with milk and spread with butter. Thus the modern cry is found not to be modern at all, but to be a defeatist cry as much now as it was in the days of Juvenal, great rhetorician, and assaulter of the privileged few.

More Play Together

PLANS which bring bakers of various sections together for play as well as work are among the most important that the industry now knows. Cooperation in effort succeeds bitter factional hatreds, only when mutual understanding succeeds fear of one another. The orange, apple, raisin, milk, prune, apricot, walnut, egg, and fig producers found this out before ever they performed the miracles of merchandising that now make California famous.

The latest triumph of their cooperation shows how this works out. Their research experts found that walnuts pressed into a base of figs and raisins made a delightful confection. The three products are now combined in sales packages that carry them vastly further than any one of these products could go alone.

The wheat farmers are struggling in their hour of disaster to learn what the egg producers and raisin, orange, and apple producers already know. Bakers will follow along this path, of course, as they become acquainted and lose the fear that distance from one another's hearts breeds in them.

Therefore, it is with real joy that we look over the plans for the New England Bakers Association to charter a steamship in March and sail away through southern seas to Bermuda. As these words are written Los Angeles goes into action for a general jollification over the Staff of Life that rivals the Harvest Festival of old.

And now comes the Potomac States

Bakers Association with plans for a cruise down historic Chesapeake Bay to Norfolk, and then a rendezvous at the Virginia Beach hotel. It combines vacation advantages with convention plans. Too many bakers cannot possibly sign for these parties. Every baker who goes will find that every day in every way the experience of attending will enrich his life and make him a better baker and merchandiser.

Our New Welcome

TWO years ago when an editor took his pen in hand to write about baking, his principal effort was to shepherd the housewife back to the kitchen. The editor felt a call to this great purpose. But the housewife has been heard from since those great crusades. She has let the editors know that she has more important work in the world than bending over bread pans. She has let the editors know, too, that the modern baker's loaf is acceptable to her and she wants the best loaf that can be baked rather than the cheapest loaf.

To this situation the editors are waking up. They no longer come at the industry with fire in their eyes, all set for battle. One editor of a great National magazine wrote the Institute, asking for data about the modern baking industry.

It was immediately furnished in the form of an article, with illustrations. "Thank you for the article and the pictures," read the letter that came back in return, "the only difficulty is that I want to use them all and I wonder how I can find the space."

This betokens a new attitude to the baker's product and a new spirit of welcome for the baker's story. And this is only one of four National magazines now asking for information about our industry, with intent to print it. Bakers who do not believe in supporting a National headquarters please note.

The Bakery Merchandiser

*Why He Must Have Co-operation With Production Manager
To Obtain Best Results*

By OTTO L. COOK*

JUST as there are fundamental principles to be followed in the manufacture of quality bread, there are fundamental principles that must be followed in merchandising it.

Essential to the success of any business, of course, is a quality piece of goods. You have been equipped with the fullest knowledge available in the practical and scientific essentials for producing quality bread. Doubtless most of you students will give your major effort to bread production. I want to say a word here, however, about the importance of co-operation between the manufacturing and selling departments in a bakery.

I have observed instances where no such co-operation existed, to the detriment of the concern's progress. In the producing end of the baking business, those responsible should constantly be aware that there would be no production without a market for the goods, and after all a market is created by public demand for a product.

However proud the person or persons responsible for the bread produced in a bakery may be of its quality, the final judge is the consumer; and those representatives of a bakery handling the selling of goods are largely competent to say whether or not the consumer is being satisfied.

Now for the fundamentals which must be observed in the successful merchandising of bread:

I place first importance on the matter of courtesy. A bread salesman entering

a store with a smile, a cheery "Good morning," and a pleasant demeanor, maintained throughout his stay in the store, leaves an unforgettable impression. The same is true of sales people handling retail trade. How often have you and I entered a retail store for the purchase of some item, and received very indifferent attention. The impression left with us was not so much a disagreeable one of the person waiting on us, as of the concern employing that person.

The next fundamental is cleanliness. **A bakery wagon is a traveling advertisement for the bakery running it.** The salesman on the wagon is a representative of the bakery. If the wagon is dirty and needs painting, and the driver wears a flannel shirt, soiled overalls, etc., what impression can the public get of the products of the bakery represented by such an outfit? A comparison can be made by going into Marshall Field's, and then into a store on Maxwell Street.

This matter of cleanliness should also extend to the interior of a wagon, bread cases in the grocery, and handling of bread on its way from wagon to grocery. In retail bakery merchandising, cleanliness really overshadows courtesy, because people are coming into direct contact with the place where the goods are manufactured and sold, and the impression of cleanliness, if followed out, stamps itself indelibly on the mind of the purchasing housewife. And it must be carried through in every detail! A clean store, with a clerk wearing a dirty apron, focuses all the attention of the purchaser to the dirty apron and off the product.

* In a talk to School of Baking students at the American Institute of Baking. Mr. Cook is of the Sales Promotion Department, of the Fleischmann Co.

Next in importance in these fundamentals of merchandising bread, is SERVICE. The reputation of our company for uniform service in the delivery of yeast has been a big asset to our business. It can be the same thing in a bakery business. Knowing when to expect a bread salesman every day, and assuming that he has through his courtesy and care in handling bread built up a personal following among his trade—will oftentimes forestall the efforts of competitive bread concerns, who may get on the ground before the salesman of whom we are speaking arrives.

Arranging Bread in Store

Under the heading of Service, of course, comes efficiency in the arrangement of bread in the store, so that it may have proper display to the public; careful attention to rendering bills for purchases; and carefully watching out for the customers' interests in every particular. If I were a baker operating a wholesale business, I would in my salesmen's meetings equip them to intelligently discuss progressive ideas for the building up of a grocer's business. For instance—explaining the value of increasing the sale per customer in a grocery, displaying profitable merchandise, handling items with a rapid turnover, and other important details.

Of course, under the heading of Service also comes the service that a selling employee can render to his employer, such as keeping him informed on competitive activity, trade attitude, promptly reporting complaints, so that the manufacturing department can quickly overcome any trouble, watching the purchases of the customers carefully, and getting behind any who are falling down. A baker must remember that his wagon salesmen and store clerks are representing his business to the public. If these employees

are not trained to do this properly—that is, in a dignified, courteous, business-getting manner,—how can the bakery be properly represented to the public? One would be surprised to know the power of a bread salesman in building business for his bakery. The same is true of clerks in a retail store.

Assuming the selling organization of a bakery is in proper shape, we can discuss consumer demand. Perhaps, after all, the most important fundamental in merchandising bread, is creating the consumer's demand for it. This brings us to the question of ADVERTISING. Before getting into advertising, however, it has been found sometimes advisable to determine the public wishes or attitude on the question of bread, particularly in connection with the launching of a new loaf by a concern who has been doing business in a market for a number of years.

The actual cost of house to house canvassing is not much, and it certainly gives most accurate data to follow in the conduct of a business. I understand that certain large concerns maintain a corps of canvassers year in and year out. The proprietor or sales manager of a bakery should also canvass frequently as many of the grocer customers as possible, in order to keep in touch with their attitude on the products of the concern.

Creating a Desire

The purpose of ADVERTISING, of course, is to create a desire for a product; and the co-ordination of the various kinds of advertising mediums brings this desire to a focus in a sale. Through the medium of newspaper advertising, properly prepared—or through a letter written to the housewife by the baker—or through a circular or insert wrapped with some other product reaching the home, the housewife learns about a certain bakery product. If the ad is properly construct-

ed, a desire is built in her mind for this product, but she isn't quite sold. She starts on a shopping trip, and either in the street car or on a billboard, she sees further advertising of this bakery product. Her mind is refreshed on the matter. Going into the store, she sees a store sign again featuring this product, but her mind may still be rather indefinite on the subject of bread, so she asks the grocer for a "loaf of bread." If the grocer has been handled properly by a salesman—which means that he has been sold on the profit in bread, and through your salesman's courtesy and service, is sold on your particular bread—he gives her a loaf of your bread.

Suppose that the housewife, after she gets this bread home, finds it is not satisfactory—what is her opinion of the bakery, and the goods produced? So, I say it is most important that every factor in the merchandising of bread be running smoothly, in addition to the quality of the product's being satisfactory to the public, and the equipment in a position to maintain a uniform production—**before** advertising should be undertaken.

Essentials for Success

The essentials for succesful bakery advertising are:

Establishing a brand name for bread, for the protection of the bakery producing it; and educating the public on the value of bread as a food, and the economy of it.

Price advertising is almost a thing of the past, in connection with advertising bakers' bread. Bakery advertising should have the dignity that should go with the most important food, should be honest in its statements, and should be constantly kept before the public. As I speak of dignity in advertising, I am reminded of a painted board sign some 60 feet long, on the principal street of Mobile, Ala-

bama, containing the words "Eat Smith's Bread." The words "Smith's" and "Bread" were in gold-leaf letters some six feet high! Advertisers find it possible to dignify the advertising of washing powder, plumbing—even garbage cans. It certainly is therefore not only possible, but essential, to keep the advertising of bread dignified, and savoring of quality and cleanliness even in the advertising.

Effect of Dignity

And advertising has its effect on an organization. Advertising implies an obligation on the part of the advertiser to the public. This obligation is felt by all members of the advertiser's organization, **if he keeps them in touch with his advertising.**

The baker is taking the place of the housewife in her kitchen. It follows therefore that to be successful, he must keep this in mind, and have the quality of his product and the conditions under which it is made and sold, under such control that she is better satisfied, if possible, with his product than she would be with her own.

There is still a tremendous amount of bread baked at home. That is the bakers' potential bread market for increased business. It can be won through education, coupled, of course, with the proper quality of goods, and the proper service behind this goods.

Like a great many others, I feel sure that the American Institute has much to teach that would be very useful to one in charge of a bakery's management. I believe that the Institute as an organization deserves the support of all progressive bakers, and of all leaders having to do with wheat foods. I shall not consider my education complete until I have taken the Institute course.

—Horace Hopper, Moose Jaw, Canada.

Growth at School

IS the trade press working for the baking industry in a way that counts to the best advantage? A recent experience has enabled those at the American Institute of Baking to test the matter out. The trade press took note of the hard struggle at the Institute to launch all at once and simultaneously more activities than some industries have been able to build up in a decade of striving.

There was the School of Baking, which most bakers said was far out of its time and would not "grow up into being" for another decade at least. There were the executive offices, which had heretofore functioned only as a secretary's desk, over which enough dues were gathered in to pay the secretary's salary—if he were industrious.

There was the service laboratory where tests of all bakers' bread offered were to be made, with a view of raising the standard of bread to the fullest possible degree.

There were the research laboratories and the nutrition laboratory where scientists were to delve after unknown factors in the problem of producing good bread.

All these functions—and that of collecting and distributing opinion and data about the baking industry—were duly launched within a single three months' period. There was a terrific trail of opinion to the effect that the Institute was squandering money and effort, and far overbuilding such needs of the industry as bakers would ever care to support.

The beginning of 1924 finds every one of these functions in full swing—and **producing results of great value.** Baking Technology for this year should publish research papers from our own research laboratories, that will fill its columns with new data upon our important problems.

The service laboratory chief, O. W. Hall, is crying for more space and more equipment, instead of reporting that the effort to launch his work has been overdone. But the School of Baking is the pride of the Institute, and the most definite evidence that the bakers have grown enormously in two years in their appreciation of the work that few saw the need for three or more years ago.

The school started less than two years ago and grew at this remarkable rate:

	Total Members
First class, May, 1922.....	5
Second class, Sept., 1922.....	14
Third class, Jan., 1923.....	18
Fourth class, April, 1923.....	28
Fifth class, Sept., 1923.....	33
Sixth class, Jan., 1924.....	36

The list of members of the Sixth class does not tell the whole story, as the capacity of the class rooms is thirty-six students and the full capacity was not only attained, but fifteen applicants were told to reapply in April, as the January class was already overfull.

Instead of having to retrench because of "setting too much sail," it has become necessary for the Institute Committee to devise ways and means at once of expanding the capacity of the school. This matter is now under serious consideration.

An examination of more than a hundred requests for information about the school shows the widely varying experience and angle of interest on the part of those who wish to attend.

Many wrote, asking what costs amount to, outside of the school fees. The experience of students is that board and room may be had for from \$15 to \$18 per week and that other expenses can be made as flexible as the interests and inclinations of the students, plus their ability to pay.

One applicant said he was a young man

who had been offered a position as a flour salesman provided he could demonstrate the flour's baking qualities to prospective buyers. He is now at work in the school—one of those forerunners of the day when the flour salesman will know flour as well as the baker, and will understand just how to meet the baker's ideals in flour desires.

Another applicant reported that he had been a bakery foreman for ten years, but wanted to refresh his contacts with bakery science and check up on himself. He was told to come along—that one of the best students we ever graduated had been a manager for sixteen years, and had gone back able to get bread quality previously unheard of in his plant.

An applicant from Galveston wanted to know "if this school is a co-ed affair." He was told it was not—no young woman had ever expressed a desire to learn about baking.

The range of very recent inquiries has indicated the widespread manner in which bakers have taken up the business of obtaining trained helpers in their plants. These inquiries have come from California, Kansas, Honolulu, India, Canada, England, Montana, Arkansas, Nebraska, Illinois, Oregon, Washington, Pennsylvania, New York, and Massachusetts.

And what of the trade press in bringing this remarkable growth about? Last year the papers of the trade kindly inserted advertisements as their contribution to the growth of the Industry's own school. Two applicants returned the blanks inserted in one of these trade papers. This year the return from the same trade paper was twenty-seven applicants, and other papers were in proportion. The news so freely published about the school carried its message home so decisively that to the services of the trade press must be given a large share of the

credit for its remarkable growth and success.

The Flour Men Join

THE path of all the industries associated with wheat merchandising runs, of course, directly towards an American Wheat Foods Institute, where the research problems of all these foods together—including ways to use them jointly—can be worked out. No man who ever saw the delicious confections made with raisins and chocolate, and the confection known as chocolate dipped ice cream, which made ice cream a between-acts confection at theaters, can doubt that bread must be studied jointly with all the foods it can be used with.

Mr. Richard Meyer is telling the story of meat and bread at the Indianapolis convention of the baking industry this month. The Toast Campaign intrigues the interests of food merchandisers in every part of our country.

And in the midst of these events the American Institute of Baking takes one step forward on the path of its manifest destiny of growth and enlargement.

From the trades and industries closely allied with baking, come representatives for the Institute Management Committee. George Dean represents the Bakery Equipment Manufacturers, Harry A. Lockwood, the Allied Trades of the industry, and Walter Stern the Millers. Mr. Stern was chosen by the Millers' National Federation, as were the other representatives by their respective groups.

In response to the notice of his selection Walter Stern sends the following appreciation of the new services he will be called upon to perform as liaison officer between bakers and millers in Institute matters:

"I desire to give an expression of appre-

ciation on behalf of our organization for this opportunity of cooperation, and the courtesy implied thereby. I feel that I express the sentiment of the rank and file of the millers, as well as our organization as a whole, when I say that we consider it a great privilege to participate with you in your deliberations in furthering the purposes and conduct of the American Institute of Baking. The greatest praise is due to those who have been active in bringing the Institute to its present flourishing state of service, and for putting at its disposal for constantly increasing usefulness, such a splendid faculty and staff. Bread bakers and flour millers have every reason to have a feeling of fellowship and mutual interest in the furthering of scientific research and education for improved methods in bread baking, and so the Millers' National Federation hails with delight the chance to take advantage of the privilege of furthering the purposes and enlarging the usefulness of the American Institute of Baking.

I desire to state that I am very pleased to assure you of my every cooperation.

WALTER STERN."

We hope to present in future numbers the views of other new members of the Institute Committee, who have taken hold of the task of expanding its influence for usefulness.

I have found the knowledge gained at the American Institute's School of Baking to be of unlimited value.

—Henry C. Scott, Hazleton, Pa.

The School of Baking course at the American Institute helped me more than I can tell you. Results I can now get in the bakery prove that the course is a great thing for all who can take it.

—Ray Farlin, White Front Bakery,
Webster City, Iowa.

By Radio

WHEN an industry is properly organized and has a National headquarters, its opportunities to serve the welfare of its members, increase in so many spontaneous ways that it is hard even to record all of them.

Suddenly, on the night of Dec. 27, General Manager, N. G. Symonds, of the Westinghouse company in Chicago, opened the Westinghouse Radio Broadcasting Station to the American Institute of Baking. A speaker was furnished from the Institute who told the story of wheat, bread, toast, and education within the baking industry.

Out in Rocky Ford, the famous cantaloupe town of Colorado, A. A. Coster sat at his receiving set listening to radio talks. There came through the air above the prairies of Illinois, Iowa, Nebraska, a story of—his own industry, his own bakery product.

"Last night we heard you over the radio set very clearly," he wrote in to the Institute, "and we enjoyed it immensely. We are carrying out the Eat More Wheat program and it was very gratifying to hear a talk over the radio on that subject. Come again, American Institute, your cause is a good one. We are all Doctors of Doughnuts and Professors of Pumpernickle in our plant here."

The kind of work that made this broadcasting possible, and hundreds of other strokes that it is possible suddenly to make, is supported by one out of every sixty bakers in America—and it takes only one loaf of bread per oven per day to put your National to work for you in the most effective manner possible. There have been doubts, suspicions, and fears, in the past. Isn't it time to resolve them in favor of building in united strength?

If We Eat White Bread

*No Harm Will Come to us, as is Shown by E. V. McCollum and Nina Simmonds,
of Johns Hopkins University*

SOMETIMES our National magazines flare forth against the baking industry's chief product, white bread, quoting meek imitators of the masters of nutritional knowledge. E. V. McCollum is quoted by foolish ladies so often that he has prayed to be delivered from many of them as heavy misquoters, often gifted with a dolt's power to do mischief.

At last a National magazine has obtained from Dr. McCollum in his own words his own opinion of white bread. The magazine is McCall's, which is not only ably edited but has one of the largest American circulations among housewives. Every baker who has to meet assaults on white bread from apostles who want to drive the people to eat whole wheat, regardless of the fact that the people don't like it and never "stay put" upon it as a steady diet, should keep these words of Prof. McCollum at hand. They are from the January number of McCall's:

Many charges are made against white flour. It has been pointed out that white flour is more expensive to manufacture than is whole wheat flour. It has been charged that the white flour is deficient in amount of proteins and of mineral salts as well as in all the essential vitamins as compared with flour made from the entire wheat kernel.

It is asserted further that whole wheat is a corrective for constipation, a condition from which few adult Americans escape; indeed, it is maintained that white flour bread is in no small degree the cause of this unfortunate condition.

The further charge is brought forward that bread made from white flour, being softer than whole wheat bread, requires

less chewing, and that it tends also to leave starchy deposits on the teeth; while, on the other hand, bread made from whole wheat needs to be chewed thoroughly, this exercise improving the teeth greatly.

If one knows all the facts of chemical analysis of the two kinds of flours and if one has followed the studies in metabolism and nutrition which have been carried out by the best methods perfected in recent years, one admits each of these contentions.

It may seem strange, in the face of such an array of sound arguments, for us to insist that it really does not make any difference, so far as the health of the nation is concerned, which kind of bread is eaten.

The crux of the whole matter is that our diet sadly needs to be improved. This need is shown by the prevalence of under weight in children, of skeletal defects of the type known as rickets, and of teeth of such poor quality that they decay early and cause many types of diseases which result from focal infections.

Improving Diet

But there is a better way to improve the diet so as to get the desired results, than by insisting on the use of whole wheat flour.

First, let us consider the claim that whole wheat flour is superior in all its dietary properties to white flour, except possibly in being slightly less digestible. We need to consider only two dietary factors in this connection. One is that whole wheat is very poor in the element calcium, the principal component of lime which is so necessary a part of the skele-

ton. The other is that whole wheat is very poor in the vitamin A as compared with certain other foods. Our usual diet in America consists largely of white bread, meats, potatoes and sugar. All these are exceedingly poor in both calcium and vitamin A. Therefore, even if we gained through the consumption of whole wheat bread, the added nutritive qualities of the whole wheat over white flour, we still should have a serious incomplete diet.

It is of little advantage to improve our diet in two or three respects if it remains distinctly defective in two very important factors. Since whole wheat is not a complete supplementary food for our diet of refined flour, meat, potato and sugar, we must find other corrective foods. What we need is a sufficient amount of foods which are in every sense **protective foods**, in that they will correct all the defects of the articles which form the major part of our food supply. This function whole wheat cannot perform.

But two kinds of foods, suitable for human consumption in liberal amounts, fulfill the requirements of protective foods. Milk, as we have often before emphasized, is the more important of these.

In proper amount, milk will do everything which whole wheat could do to improve our dietary and do it far better; in addition, it will supply in abundance both the missing calcium and vitamin A. Milk is not only the one food for which there is no effective substitute, but it is the best supplementary food in the sense in which we have defined a **protective food**.

Bread and—

A single correction should be made in this statement. Milk does not aid in the elimination of intestinal waste, whereas whole wheat, in some degree, has such a property; however, the regular consump-

tion of liberal amounts of the other class of protective food—leafy green vegetables such as spinach, kale, lettuce and so on, will stimulate intestinal elimination—and are far more effective in this respect than whole wheat bread is.

We can hardly over-estimate the importance of a diet sufficiently rich in calcium and containing an amount of this element appropriate to the amount of phosphorous in our food.

If the diet contains a proper per cent of these mineral matters, the skeleton is protected against the deformities characteristic of rickets—such deformities as abnormally large joints, collapse of the ribs so as to leave too little room for the heart and lungs, crooked limbs and other malformations.

When the diet is relatively poor in both calcium and phosphorus, or relatively rich in both these elements, the bones of the skeleton are of better quality than when the diet is rich in one and poor in the other.

In other words, rickets are much more liable to develop when the diet is poor in calcium and rich in phosphorus, or poor in phosphorus and rich in calcium, than when a relative lack exists for both, or when both are furnished somewhat in excess of the body's actual needs.

Bone Development

So serious is the problem of bone and tooth development in man that we should consider the wisdom and expedience of altering our national dietary. But substituting whole wheat flour for white flour in the dietary would exercise little if any influence upon the bone and tooth development. The use of white bolted flour, now so widely advertised and consumed, seems entirely justified.

It is doubtful whether whole wheat bread demands to be chewed more than bread made of ordinary white flour.

Neither has to be masticated to any great extent and the average American is likely to spare his jaws as far as possible from masticatory effort.

This lazy inclination is an additional reason for eating two salads a day since raw lettuce, raw chopped cabbage, celery and fruits practically necessitate fairly vigorous exercise of the muscles of the jaws. Such vigorous chewing improves the circulation in the teeth and helps to preserve them. And the salads provide the vitamin C, which is found in fresh raw foods.

Few persons who are well informed about nutrition will espouse with enthusiasm the cause of whole wheat bread.

Eddy on White Bread

WHAT are the bran bread advocates going to do now, that the very scientists whom they have quoted most go back on them? Dr. McCollum has shown them that they have misread his lectures at Johns Hopkins, and now comes Prof. Walter H. Eddy, professor of Physiological Chemistry, at Teachers College, Columbia, and author of a book known as "The Vitamin Manual."

Dr. Eddy knows that "cow feed" was formerly sold at \$15 or \$16 a ton, and that after bossy got her bran she fed its valued vitamins back in the form of milk and butter, where they were more tasty and appetizing than when mixed up with rough, indigestible cellulose.

Between trying to make people hate white bread, which they really like, and like the bran and whole wheat breads, which they really dislike, in the main, Dr. Eddy prefers the white bread well spread with butter and enriched with milk.

"People like white bread," Dr. Eddy stated in the New York Evening Post, "and experience has shown that they will

not let the whole wheat bread replace it in the every day menu. Now milk is the best single food with which to supplement bread. But unfortunately the same grown person who insists on his child drinking a quart of milk a day will often not touch it himself. Thus, you see, we run into food like habits of people. So the easiest way is to put the milk into the bread, and this, incidentally, will improve the taste of the bread and at the same time furnish all food elements necessary to the body. Then we can eat what we want of other things.

"To this end the departments of nutrition at Teachers College have all been working together, and they feel that in part at least they have solved the problem of better bread. That new standards of bread quality must be established if people are to be induced to eat more bread, Teachers College feels is essential. The weight of the loaf and the purity of the ingredients are all that are demanded of the loaf of bread, now sold commercially.

"This is not enough. These standards take no account of nutritive quality. The baker who puts milk in his bread should not have to compete in price with the baker who uses only water. So with the idea of making a loaf that is far more nutritious and eatable than the usual commercial loaf, Teachers College carried on many experiments.

"The results prove that by using milk powder more milk solids can be got into bread than by using fresh milk, and that since butter is usually eaten on bread, it is not necessary to have the added expense of cream, but the skim milk powder fills the requirements."

Dr. Eddy performed a service in the war that makes every soldier his debtor. He had a hand in selecting the diet, as chief of the Department of Foods and

Nutrition. In that work he saw that the soldier obtained the foods which guaranteed him against deficiency diseases that in former wars have proved a worse foe than enemy bullets.

He will be brought in touch with the American Institute laboratories and his efforts to "build up a tasty and nutritious loaf" will be heartily seconded, of course, by all progressive bakers. They have already done much more than, perhaps, he is aware in developing the possibilities of the milk loaf. In at least four great American cities it commands the market, and has won its way on its own merits in each case.

New News of Butter

THE butter producers are hearing from home these days—and in a way to teach them new ideas about the baking industry and its most recent accomplishments.

Everyone remembers the experience of the yeast manufacturers last year when Hot Cross bun day came around. They made all plans for a big domestic call for yeast. There had always been such a demand before. But this time the demand utterly failed them, and the call came instead from the bakeries.

The people had decided to turn over the Hot Cross bun business to the bakers.

Now comes E. K. Slater, editor of the *Butter, Cheese and Egg Journal*, published at Milwaukee, Wis. He has looked around at the matter of declining butter sales to home folks. He has found that such sales for Christmas pies and cakes are "nothing like they used to be." Where then has the pie and cake business gone? He finds the bakers have it, and records his find,—with an idea that he gleaned from this discovery, in the following terms:

"People inclined towards figures would

be interested in the amount of butter used in Christmas cakes. Not as much as you might think. Mothers' pies and cakes are almost history. Now-a-days the housewife sends down to the bakery for her baked goods. That's an important reason why the dairy and bread industries ought to talk things over. There's not enough butter used in cakes to-day. The funny part of it is that the bread men are willing and the dairy people who probably have more to gain, are showing little interest. It seems certain that there is opportunity for mutually profitable co-operation in this direction."

Newer Knowledge

In the nutritional laboratory of the Institute a mother rat brought ten youngsters into the world. For lack of just a touch of certain food elements the mother's milk glands were shrivelled and non-productive. All the brood was doomed in advance to die. The mother cuddled them until the end came. A very few years ago no man in the world could have exercised such control over any animal's growth, and lactation. Now miracles of control can be exercised. In another cage a mother, no sturdier looking than the mother whose young were born doomed, had been given the infinitesimal quantities of the missing factor. Her young were born happy and were suckled into sturdy life and growth. Is there any gainsaying that bakers must find out all the new facts of nutrition and make them available to the industry? It is the Institute's pride that the Nutrition Laboratory now becomes one of its important features.

I want to compliment the Association and the faculty on their school which, after my experience as a student, I could recommend to anybody.

—Lloyd A. Weisenberger, Danville, Ill.

Employees of Modern Bakery

Department of Labor makes Important Survey of Working Conditions and Production Volume Per Hour Per Man

THE Department of Labor has awakened to the fact that the modern bakery is no longer a place of craft employment, where skilled craftsmen make up the whole of the pay roll. It has just completed a study of a number of modern bakeries, from the view point of labor conditions.

Its results have been embodied in a report to the department by Robert S. Billups of the Bureau of Labor Statistics. His report might well be referred to the authors of a queer graph put out by the same department which shows, without any explanation, the downward trend of wheat prices contrasted to the refusal of bread prices to go on down with the wheat.

That the war period has been followed by a greater revolution in the methods of bread making than occurred in all the previous years from Adam on down to the World War, is something the graph makers completely overlooked. They did not take the slightest account of the new factors of expense created by the new methods of making bread, in fields where costs are not sagging, but are still peaking-up towards post-war new high levels.

But notice how, in contrast, comes this remarkably intelligent and comprehending statement from Mr. Billup's report to the Labor Statistics Bureau:

"The modern bakery is a thoroughly organized concern, equipped with all of the latest improved baking machinery. It is the aim of such bakery to supply the public with the very best products at the least possible cost of production. This can be accomplished only by having an efficient organization, and efficient opera-

tion of machinery, thus saving time as well as labor."

And Mr. Billups catches the spirit of the industry when he records:

"An official of one of the bakeries that furnished information for this article said: 'I am looking forward constantly to the time when our bakery will be so thoroughly equipped with machinery that it will not be necessary for any employee to handle the dough or the bread, until after the bread has been wrapped and is ready for our drivers.'

"Another said: 'If we returned to old conditions before the installation of machinery (blenders, sifters, mixers, dividers, rounders, moulders, panners, wrappers, and automatic proofers and traveling ovens) we would have to increase our force of productive employees several times, and enlarge our flour space to three or four times its present size in order to produce as much bread per day as we are now producing in that time.'

"Bread making, like many other industries had its days of hard, heavy labor. The introduction of machinery has made the work in the bakery comparatively easy and light, has reduced the number of employees necessary to operate the bakery, especially the number of bench hands or hand bakers, oven men, and helpers, and has greatly increased production.

"Without entering into the question as to whether or not increased production has under present conditions made any change in the total cost of production, it may also be said that the use of machinery has made it possible for the consumer to buy good, wholesome bread for less than it would cost, including time and fuel, to

produce bread of like quality in the home. As has already been stated the average cost of bread per pound as presented in this article is limited to productive employees only. Other items such as capital, including investments in land, buildings, and equipment, along with cost of materials, insurance, taxes depreciation, salaries of officials and office employees, wages of drivers and all other non-productive employees not covered in this study, and probably other items not mentioned, should also be included in order to arrive at the total cost of production per pound."

Bakery Men's Output

Typical modern bakeries show a great variation in the number of loaves of bread per man per hour. The table prepared on this subject makes an interesting picture of the modern bakery at work:

Employees and city.		Average number of pounds of bread produced per man per hour.		
	Number of employees.	Low-est.	High-est.	Average.
All employees:				
Baltimore	135	70	103	92
New York	733	52	95	73
Philadelphia	451	52	68	62
Washington	300	48	72	63
Bakers (mixers, bench hands, machine hands, and oven men):				
Baltimore	43	138	427	307
New York	345	101	266	155
Philadelphia	189	87	162	146
Washington	117	116	189	165

The variations in the loaf output of production men per hour, as shown in the above table, of course coincide with the presence or lack of it, of the most modern machines. As the burden switched from muscle power to machine power the total loaf output per man increased. But the man no longer did the work and the machine represented a large investment of capital.

These facts are slowly working to the surface and whenever they are under-

stood, respect for the industry replaces a fear, and a hatred based on fear, that it is gouging the people in their most precious of daily foods.

This report to the Bureau of Labor Statistics quotes an editorial from *Bakers' Weekly* to give a view of the satisfaction the modern baker gets in seeing his modern product accepted by the housewife. The report could well be on file in every bakery. It is Vol. XVII, No. 6, for December 1923.

A Postscript

On the back page of this magazine is an article about forty women who tested out a baker's bread, and found that all agreed on the same loaf as the best. It is written for all who are doubtful about the value of quality. There is a rather sad postscript to it. At a meeting of American Bakers Association where a speaker bemoaned the lack of vision on the part of so many bakers, Henry Stude, whose bread was involved in this test, spoke up: "The few members who really join to build their industry," he said "are the same old guard that have fought along from the first. You can talk of getting more— but more will not see, or at least have not." Won't you, Mr. Baker, who see, tear off the back page, and send it to any of your friends that you believe will come along? Yes, write for more copies, and we'll send them.

As a professor of preventive medicine I am very much interested in foods of all kinds, and it is very gratifying to see the advances in the baking industry that have been made through such efforts as that of the American Institute.

—Mazyck P. Ravenel, M. D.,
University of Missouri, Columbus, Mo.

Animal Tests In Nutrition

Why the American Institute of Baking Seeks New Facts About Bread

By ROSCOE H. SHAW

Chief Department of Nutrition, American Institute of Baking

(Second of a series of articles commenced in the December number)

IN our first paper we told about some of the remarkable developments in the science of nutrition that have taken place within a comparatively few years. Many of the important discoveries were made possible through the feeding of animals. In this paper we will tell in a brief way the story of the animals that are used and how they are made to contribute to the cause of nutritional science. We shall also tell about the new facilities of the American Institute of Baking for attacking such problems in nutrition as pertain to bread and the materials that enter into its make-up.

Quite a variety of animals have been used, including the dog, the cat, the guinea pig, the monkey and the white, or albino, rat. Pigeons have also been used in certain kinds of experiments. The latter are particularly responsive to diets deficient in Vitamine B. Guinea pigs are very well suited for work with Vitamine C, since they are very susceptible to scurvy. We are not much concerned with Vitamine C, for, as was brought out in the first paper that vitamine is killed at the temperature of cooking, so we could hardly expect to find it in bread. For such work as nutritional studies of bread and the materials used in making it, white rats are almost exclusively used.

White rats are sometimes called albino rats, and if a much more scientific name is desired, *Mus Norwegicus Albinus*. The origin of the breed is largely shrouded in mystery. They are known to have sprung from the wild Norwegian rat because of certain similar physical characteristics and the fact that they will freely inter-

breed with them. It is supposed that way back many generations ago some one captured some "sports" from the Norwegian rat and bred them. It is not known whether our present albino rats sprung from a single mating of this sort or whether several such matings were the origin.

The albino rat is almost an ideal animal for experimental work in nutrition. It is an animal of exceptionally clean habits and is a natural pet, easy to keep and handle. It is omnivorous and breeds freely at any season of the year. Its span of life is but three years and at this age compares with a man of ninety. The albino rat breeds when about three months old. This makes it possible to study the effects of a diet through several generations within a comparatively short space of time. Because it is so well adapted for scientific work, not only in nutrition but also in other lines, the albino rat has been very carefully studied. So much data has been accumulated that we might almost say its life has been standardized. Tables have been published, showing averages for the weights of hundreds of rats at every age from birth to old age. These figures serve as a basis for comparing a rat on a diet with the normal or average rat. If we know the age and sex of a rat, as well as his weight, we can tell at a glance whether or not he is above or below normal by referring to a table made from these figures.

As an example of how a feeding test is conducted, we might take the study of the comparative nutritive values of full milk bread with bread made with milk as one-third of its liquid ingredient. Such a

study was reported in this journal a few months ago by C. B. Morison and G. W. Amidon. Of course, the first thing that is done is to prepare the samples of bread. The bread is then cut in slices and allowed to dry at room temperature. When dry it is pulverized in a suitable mill and thoroughly mixed.

As a matter of fact it is really necessary first of all to have a sufficient number of rats of the right age on hand. The rats for this sort of study are taken as soon after weaning as possible. Three groups of rats are selected, each group consisting of from four to six. Care is taken that the different groups compare as nearly as possible in age, weight and sex. Sometimes the rats are kept in individual cages and sometimes two or more are kept in the same cage.

Milk as a Factor

One group of rats receives as its sole diet the pulverized whole milk bread, another the bread with one-third milk, and the third which serves as a control, a diet which has been previously found to be complete in all the essentials. The rats are allowed all they can eat of these diets; there is some always before them. They are also provided with plenty of clean drinking water. At regular intervals they are weighed and growth curves made from such weights.

The growth curve is a graphic way of showing how the rat is thriving on his diet. It is made on paper ruled off in squares. The construction of such curves is very clearly shown in the accompanying chart. It will be seen that the squares running vertically represent 20 grams each and those running horizontally, 20 day periods. If a rat, for example, is found to weigh 90 grams after he has been on his diet for 20 days, a point is placed where the 20 gram line intersects the 90 gram line. If 20 days later he

weighs 110 grams, another point is placed where the 40 day line intersects that weight, and so on. A line is drawn connecting the points and this line is the growth curve for that particular rat. A curve is made in a similar manner from the average weights spoken of in another paragraph. This is known as the curve of normal growth and with it is compared the growth curve of the rat on the diet which is being investigated.

In the accompanying chart the normal growth curves are shown by dotted lines. In the actual work the weighings are made at much more frequent intervals than 20 days and the paper used is ruled into much smaller squares

Discovering Food's Value

Another kind of feeding test is that used to determine whether or not a certain essential is present in a food or ingredient that goes into a food. Perhaps it is desired to learn if a certain yeast contains Vitamine B. In such a test young animals are fed on a specially prepared diet from which Vitamine B has been extracted. For a few days they will gain a little, but in a short time the growth curves will flatten out or even drop. At this point the rats are kept under close observation and as soon as incipient polyneuritis is indicated, a small accurately weighed amount of the yeast under test is daily added to the diet. If Vitamine B is present the response will be immediate. The symptoms of polyneuritis will disappear and the animals begin to grow in a normal manner.

Other examples of how small animals are used could be given, but perhaps these two will serve our purpose. Of course there are many details connected with feeding experiments that cannot be given in a paper of this sort. The animals must be kept in a room with an even temperature. Albino rats are very susceptible to

cold and the room temperature should never fall below 67 or 68 degrees F. Their cages must be cleaned at frequent intervals. In our own laboratory they are cleaned and sterilized twice each week.

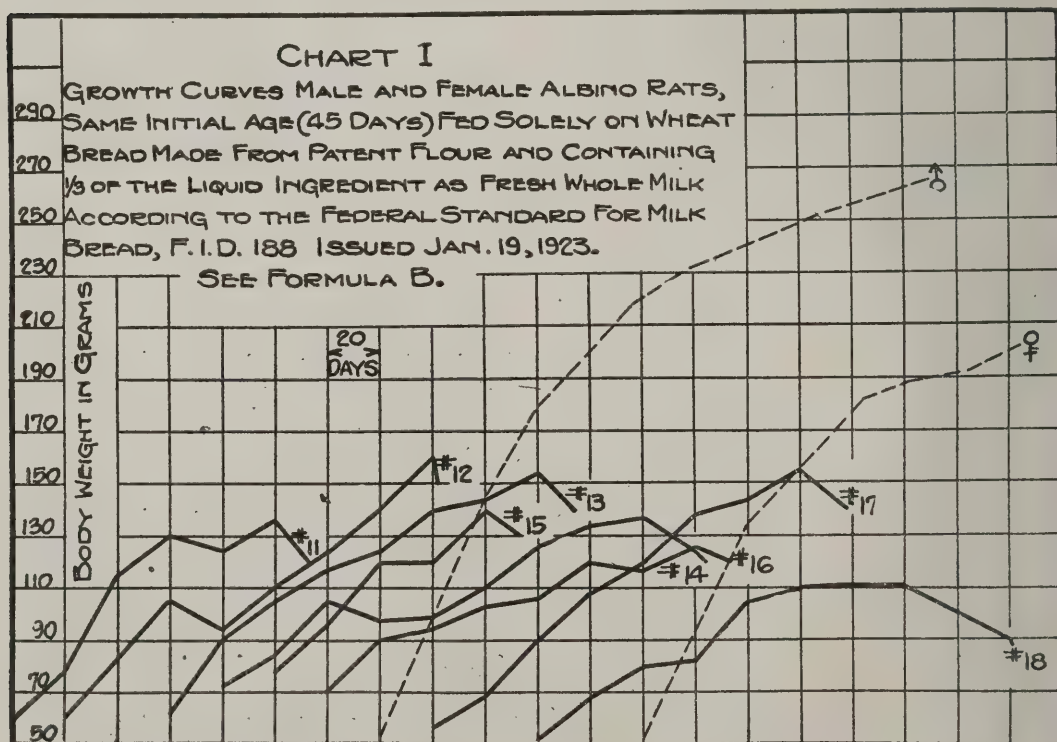
A New Laboratory

Through the efforts of the Director of American Institute of Baking, Dr. H. E. Barnard, the Department of Nutrition has new quarters, equipped with the most modern of appliances for conducting such investigations as have been described. The Department of Nutrition now occupies a building by itself, which is nearly independent of the main building. The laboratories, of which there are two, a large one for the cages of experimental animals and a smaller one for breeding purposes, have Florentine glass windows so that the light is at all times subdued. A very elaborate heating system, entirely

controlled by thermostats, is installed. This system is guaranteed to maintain a temperature of not less than 68 degrees F. when the temperature outside falls even to 10 degrees below zero. A recording thermometer registers the temperature every minute of the time, both day and night.

The floor is painted concrete, and the walls and ceilings washable enamel. Open work construction was used throughout and the whole laboratory can be flushed out with hot or cold water. The main laboratory is so planned as to allow for expansion and its capacity is about 800 experimental cages.

An office, which will also serve as a room for making photographic records, is provided. Adjacent to the office and opening into the main laboratory is a storeroom for feed. This room contains a power grinder and a work table



Working up Nutritional data. How curved lines show the life development of test animal.

equipped with gas, besides compartments and shelving. A smaller room serves as a store place for unused cages and also as an entry way leading from the outside into the storeroom.

The cages are washed and sterilized in a room specially designed for this purpose. Its equipment includes a gas device for heating water and a tank for holding it, a large sink provided with both hot and cold water, a large sterilizer and a boiler for generating steam.

In a later paper we will speak of some of the problems of fundamental interest to the baking industry that the Department of Nutrition is attacking, and some of those we expect to take up in the near future.

(To be Continued)

Bad Flour Storage

HOW many bakers give real attention to the way their flour is stored? One baker reported, during a visit to the Institute, that he tried to bake bread from flour stored in a warehouse out of which some spoiled fruit had just been moved, when the flour went in. He found the flour would not bake good bread, and that a strange, foreign taste was in each loaf. It suggested cinnamon.

The baker blamed the miller—and obtained a large settlement. Neither knew that the flour had been put in a mold infested warehouse and that molds had invaded it, eaten out its sugars, and had left their own flavor in what remained.

Another baker reported at the Institute that he had hired a deserted home next to his bake-shop for flour storage. In summer the temperatures got very high. In winter temperatures became very low. There was no regulation.

The work of the American Institute in serving as a mediator and umpire in case of disputes over flour, and as an adviser

to bakers who have trouble with their loaves, often brings happiness where the Institute staff members do not know that their service has been observed.

For instance, a Southern mill had trouble with flour and the resulting dispute with the baker worked out in a manner described in a letter to the Institute.

It follows:

"Only a short time ago we had a case similar to that you report in Baking Technology. One of our regular customers complained that he could not get good bread from our flour, but that flour from a mill located within a few miles from us was supplying them very satisfactory flour. We sent our chemist down to work with them, and after a few bakings the bread showed marked improvement.

"Then the baker called us up again and informed us that he was losing his business because our flour simply would not bake a consistently good loaf. I went down to see the baker personally and advised him to draw a sample of flour from his wareroom and send it to the American Institute of Baking. He did this and found that our flour was far above the average and **received a number of suggestions from the Institute which have wholly corrected his trouble.**

"One of the first things that we noticed when visiting the bakery was that about fifty barrels of our flour was piled up close to the ovens. There is no flour that will hold its strength when submitted to heat and it is our opinion that this baker's trouble was caused by storing the flour too near his ovens."

The American Institute, and its publications, are surely a credit to the bakers of the United States.

—Horatio Newton Parker,
Health Department, Jacksonville, Fla.

Books for the Baking Laboratory

BREAD SHOP PRACTICE, in the Light of First Principles of Baking Science. By William Jago. F. I. C., F. C. S., Bakers' Helper Co., Chicago, 1923.

This recent work of Prof. Jago was originally published as a series of articles in *Bakers' Helper* and is now available in book form.

The treatment of the subject matter is decidedly novel and the first principles of bread making are told in colloquial language, understandable by everyone. It was the idea of the author "to imagine an intelligent and adequately educated lad who had decided to become a baker and wished to be introduced to his business. It seemed a natural thing to take him for a tour through the bakery, point out and describe the various raw materials he would have to manipulate and the different processes which finally result in the finished loaf of bread.

"Incidentally, in doing this, chemical and other scientific explanations could be introduced in such a way as seemed to be called for in order to make clear the more practical aspect of the subject. It was hoped in this way to convey the truth that science is really the handmaid and servant of the practical baker."

The author has thus condensed the fundamentals of baking technology for the purpose of initiating the student into the first principles of his future work. From this standpoint the book is commendable in view of the inherent difficulty of handling so extensive a field in 192 pages of text. Apart from the technical side, it contains much good advice for the student who is beginning the study of baking with due emphasis on the value of a thorough school training before taking up special vocational education. The student will find Prof. Jago's new book a helpful introduction to the more comprehensive "Technology of Bread Making."

—C. B. M.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

A clinical investigation into the relationship of the fat-soluble A vitamin to the etiology of rickets. Douglas Galbraith. *Quart. J. Med.* 16, 321-40 (1923).—An improper diet or an excess of carbohydrate is not a necessary etiological factor. Rickets develops on al-

most any diet. Spontaneous healing of bones and clinical improvement was observed during summer months, even with a low fat-sol. A diet. Radiographic improvement almost always followed cod-liver oil. Massage and ultra-violet light caused improvement.

John T. Myers.

The process of panification according to the method proposed by E. Monti. G. Drogoul. *Staz. sper. agrar.* 55, 303-17 (1922).—The method consists in the sep. prepn. of the crumb and crust from flours of different compn. Flour bolted to a 75% yield is used for the crumb. The bran from this flour (25%) is reground and bolted, yielding fine bran (15-20%) and fibrous integuments composed mostly of partially lignified cellulose (5-10%). Enzymes or acids, preferably grape juice and the whey of sour milk of ½% acidity, are made to act upon the fine bran. The juices of fruits in a state of incipient fermentation and acidulated with approx. 1% lactic, tartaric, acetic or hydrochloric or other mineral acid, which completely decomposes or volatilizes during the baking of the bread, may also be used, or simply H₂O acidulated with HCl or tartaric acid. The crust is made from the reground fine bran thus treated. Two methods for the prepn. of the loaves are described: the method by stratification and the method by remixing. Microchem. examn. of the natural fine bran, the crust obtained from the fine bran treated with HCl and the crust from fine bran treated with pure H₂O by means of Vetillard's reagent and Zn chloriodide shows lignocellulose to predominate in the natural bran and cellulose in the crust from HCl-treated bran and that there is partial scission of the lignocellulose in the crust treated with pure H₂O. Chem. investigations show that a scission of the lignified matter takes place in the fine bran which is subjected to the action of acids and enzymes with the formation of free cellulose and hemicellulose so that the indigestible matter is totally or partially decomposed to yield more simple carbohydrates which are easily attacked by the digestive juices of the stomach. Consequently the Monti method is a rational system of panification which permits

the prepn. of bread of excellent taste from flour bolted to a 90% yield.

Albert R. Merz.

The bread tree. J. Pieraerts. Bull. agr. Congo Belge 14, 452-9 (1923). Chem. analyses of products of the bread tree are given. Flour prepd. from the seed resembles banana flour.

M. S. Anderson.

Studies on yeast. VII. The dietary properties of yeast. V. E. Nelson, V. G. Heller and E. I. Fulmer. J. Biol. Chem. 57, 415-24, (1923); cf. C. A. 17, 2304.—Yeast is a rich source of vitamin B, not only for growth but for reproduction, as 3rd generation animals have been reared on 5% of yeast as the sole source of Vitamin B. The postulation of a new vitamin for reproduction as suggested by Evans and Bishop (C. A. 17, 1045) is unnecessary. The majority of the young are not reared on synthetic diets contg. yeast as the only source of vitamin B, but this failure is not due to any substance of a toxic nature in yeast. Yeast proteins furnish all the amino acids necessary for growth and 3rd generation animals were obtained on diets contg. 45, 40, 35, and 30% of yeast as the sole source of protein. With 25% of yeast the young grow far below the normal rate. To make the ash constituents of yeast complete Ca, Na, and Cl only need be added.

A. P. Lothrop.

Value of sweetened condensed milk as a food for babies. Max Wolf and C. P. Sherwin. Arch. Pediatrics 40, 397-402 (1923).—Expts. were made on groups of 7 babies each, feeding raw milk, pasteurized milk, and sweetened condensed milk resp. Bone and tissue development proceeded equally well on all 3 diets. The condensed milk did not give rise to poor absorption of protein, or excessive gas fermentation.

Joseph S. Hepburn.

The phenol odor in flour and bread. Hugo Köhl. Chem.-Ztg. 47, 693 (1923).—Two possible theories are advanced for the odor of phenol sometimes occurring in bread and pastry. All varieties of bread and pastry were investigated. The method used for determining phenol was: Steam is forced through the bread or flour paste. The phenol, volatilized with the steam, is condensed in a Liebig condenser. The distillate is treated with Br. water and the phenol obtained as tribromophenol. As low as 5 mg. of phenol in a 100 g. sample could be shown by this

method. The 2 theories advanced for the existence of the phenol smell were: (1) Flour, bread and pastry stored in an atmosphere containing phenol would naturally absorb some. It was found that flour containing more than 14% water had a high content after standing 24 hours in a phenol atmosphere. (2) The phenol smell may also result from microscopic decomposition of flour. This explanation seems the most logical since actual "pollution" of the flour or bread with phenol is not infrequent in modern baking establishments. Vegetable organisms, molds, yeast and bacteria are found to produce various odors in flours, including the phenol odor. By the isolation of the various microorganisms and producing a culture on a flour-paste medium, various odors as arrack, amyl alcohol, amyl acetate and also phenol were obtained.

Russell C. Erb.

Patents

Testing bread doughs. M. Chopin. U. S. 1,468,900, Sept. 25. Flours are tested for their bread-making properties by mixing H₂O with the sample of the flour to form a homogeneous dough and a layer of this dough is then clamped between plates with suitable orifices and subjected to distension by the action of gas under pressure to det. the pressure under which a sample of standard size and thickness will rupture.

Amylolytic products; food preparations. A. E. Alexander. Brit. 198,009 Feb. 14, 1922. A substantially dry starch material is heated in presence of a hydrolyzing agent to a temp. of about 325° F. to produce a compn. having a sugar content ranging between 6 and 13%, and contg. also other products of amylolysis, together with some unaltered starch. In an example, powd. and substantially dry starch is treated with about 0.5% by weight of pure HCl previously diluted to about 10° Be. The mixture is heated to 325° F. in a steam-jacketed converter provided with agitating means and maintained at that temp. for about an hr. Regulation of the heating so that the moisture present in the mixt. is evapd. before conversion begins is stated to improve the color of the product. The product may be mixed with wheat or other flour in various proportions and used in the manufacturing of bread.

Proving that the Women Know

IF hurried bakers never have stopped to read a line in this magazine here is a story that ought to mean something to everyone of them. It is the story of a man who wanted to know if women really understood the value of quality breads, if it really paid a baker to put extra value in his loaves.

In a state convention a baker who gives premiums and takes the value of the premium out of the quality of his bread, defended the practice when criticised by his fellow bakers. He claimed women did not know the difference and bought his low quality bread for the premiums, quite regardless of what was baked between the top and bottom crust.

O. W. Hall happened to be in this meeting, representing the Service Department of the American Institute of Baking. He asked permission to tell a story. It was a story of forty women and a baker. The baker was Henry Stude of Houston, Texas.

Some months ago the American Institute received from Henry Stude of Texas several packages of bread.

Mr. Hall scored the bread according to the Institute standards. To make sure his own judgment had not faltered in any particular he asked four other members of the staff to score the various loaves. When all the reports were in Mr. Hall found that they all concentrated on one single loaf.

Then came from Henry Stude an interesting story. Another scientific laboratory had received the same bread for testing. Its report indicated that the same identical loaf was the best. And not only had the two laboratories agreed but there was also complete agreement by a jury of more exacting judges—more consequential judges.

These judges were forty women of Houston, chosen at large from the city, and representing every phase of the city's life. Some were society women. Some were the wives of laborers. Some were club women. Some made their homes their empires and seldom ventured out into general affairs.

To each of these forty women Henry Stude sent a letter. He asked permission to send them bread, with his compliments, for four days in succession. He told them he was not seeking to give bread away, but wanted their services on a bread jury. He went to the grocers usually serving these women with bread, and said he was no premium advocate nor a distributor of free bread, and that he proposed to cover them, as to their profits on all the bread they would have sold if he had not distributed these packages of bread direct to the homes.

Forty Women Judges

The women he asked to keep one loaf of bread from each day's deliveries and compare it with the loaf arriving next day. At the end of the four days he asked that they write him which of the four loaves was the best and why. That was the test. Mr. Stude baked bread according to the various formulas the modern baker can utilize.

In a week the votes were all in. Seldom has there been such unanimity. Every vote was for the same identical loaf. It was the loaf on which Mr. Stude had spent the most money in an intelligent hunt for quality. It was the loaf that he is now centering on. And who shall say but that enormous increase in business will follow his clean, straight-cut fight to serve his people with the best there is?

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To Improve Wheaten Foods

WHEN the Wheat Council of the United States first sounded the slogan that the wheat farmer needed help now from those who urged the American people away from wheaten foods during the war, many wise men said there was only one way to make Americans eat more wheat foods. This way, they said, was to make the wheat foods more attractive, to bring baking quality up to the highest possible

level. Bakers have been climbing to new levels of quality for many years. But there are still achievements to reach out after. Somewhere in America is a baker who has solved the most vexing problem

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of your shop. If your production manager could meet his production manager in a yearly conference, you surely would have much of value to gain. Bakers who believed that an annual conference of production managers is a modern bakers' necessity, united in making a call for such a conference on March 17, 18 and 19. The place decided upon was the headquarters American Bakers Association,

at the American Institute of Baking, 1135 Fullerton Ave., Chicago.

This article is your invitation to participate. Any baker having a production manager whom he wishes to meet in asso-

ciation with his fellows having like problems to solve, is welcome to be represented at this conference. It is not a convention. It is hoped that this first effort to come together will be followed by a decision to form a permanent organization of production managers and to have them meet at least once a year for special production problems.

Some bakers have been doing this for their own private advancement for several years past. One man we knew started as a baker in Pueblo, Colo. He went to work for a bakery which participated in annual meetings of production managers. He absorbed the ideas that were talked over between managers in his company's chain of bakeries.

In his own home plant he was only a subordinate on a small salary. But a vacancy occurred in another plant that had just come into the string. He was sent to that bakery as production manager. He began to apply all that he had learned. The sales began to expand not gradually, but in revolutionary fashion. People who once tasted his bread never went back to the barely tolerable loaf they had been accustomed to. He won for seven months straight the loving cup offered monthly for the best production record in this company's system.

What is good for men of one system of bakeries is good for the industry as a whole. In that spirit Thomas King of the Livingston Baking Co., took hold of the task of arranging this first Production Managers Conference.

Men who have become conspicuously successful in all parts of America have been assigned to the work of leading discussions in the six session that will mark the conference's progress. Richard Wahl, of Minneapolis, will be one of the leaders.

G. Cullen Thomas, of Milwaukee, will be another discussion leader. He has just completed the task of organizing the new

bakery personnel for the Atlas Bread Company's Milwaukee plant. He comes from the midst of organization work to give his views to all who may face organization problems.

Only the First

This pioneer effort at forming a center where ideas may be dropped into a common pot and taken out again, each according to his needs, is not all that is being shaped as an expansion of American Bakers Association. As the production managers need their day together, so the sales managers also need their day, and the advertising managers need their day.

If the first move in expansion succeeds—if response to this notice is generous and not languid—the other moves will be followed, each in its turn. A sales managers' meeting may be followed by forming local groups of sales managers and of advertising managers. To these local groups experts from National headquarters can be sent out. Thus the best information gleaned from the whole industry in every line of specialized effort can be spread throughout the whole industry.

Farmers interested in wheat sales have taken a keen interest in this first projected conference. The farm papers have printed notices of it as eagerly as the baking press. The farmers see here a practical move towards getting more wheat into use by making wheaten foods better.

In New York similarly the bakers have met and decided to make Democratic National Convention week a National bread week as well. They have decided that during that week they will do their utmost to put out the best bread their bakeries have ever turned out. They realize now that one slice of bad bread, one bad roll, unsells that consumer on the baking

industry as well as on the place he was served the bad bread or the bad roll.

They plan, therefore, to make the bread of Democratic National Convention week a matter of intensive study. In the past it has been found that bread served in hotels, restaurants and dining cars often fell far below the standard to which the mass of bakers had attained. They will make a special drive to bring the bread so sold in New York up to the top level of quality.

Would a conference of production managers there—one that included all hotel and restaurant bread production managers—help or hinder such a move? This situation illustrates the potentialities of the new move being now undertaken. Already trade papers have evidenced the most acute interest in all that goes on at the proposed conference. They plan to cover it intensely and the daily papers have made inquiries about it. The press services are carrying advance notices, and this betokens an interest in the baking industry that was utterly lacking a year ago.

This fine, new interest in the industry was revealed everywhere during Bread Week in Los Angeles. A year ago bakers had to ask permission to tell their stories at various Los Angeles clubs. This year they were invited to tell them and were received with a glowing welcome. The Electric Club knew that the baking story was their story.

The milk groups knew that the baking story was their story. The machinery clubs knew that the baking story meant much to them—and they all came out with a sense of welcome. Speakers like John Hartley, who have addressed bakers for many years, found a new thrill in telling the bakers' story to outsiders. Mr. Hartley insists that is the thriller for him for 1924. He wants to see the practice develop everywhere.

That work will go on, of course. Inside the intensive work of developing a bond of union between production managers will give speakers much more to talk about when the principles developed are broadcasted to the world.

Remember the dates, March 17, 18, and 19. And clear your production manager's schedule so that he may attend. No other invitation than your reading this notice is essential. It doesn't matter if your production manager attended any school or not. It doesn't matter if you belong to any association or not. This group will organize for itself, around the bond of tackling a common problem. All inquiries addressed to the American Institute will be promptly answered.

Army—and Baker

ONE of the most satisfactory bits of co-operation in which the American Institute of Baking is involved is that between Uncle Samuel and the baking industry. The records of the American Institute were enriched early in February by a photograph of a group of visiting American and French army officers and U. S. naval officers.

Each of these officers serves under Major Robert Littlejohn as a student or teacher of the army's School of Subsistence. The school includes baking, flour buying, and the preparation of a suitable army ration. It happens that Major Littlejohn is a writer and reader of books as well as an army man. He displayed alert curiosity to know what the bakers of America knew about baking, that the army could profitably absorb. Several of his students are now planning post-graduate courses at the Institute. Among other things they are closely studying modern baking machines with a view of knowing what to order should there be another call to war.

Sample of A Toast Campaign

*How Kansas City Worked to Unite All Forces That See In Wheat
A Desirable Food Carrier*

AS these words are written more than 200 cities in fifteen different states have organized to broadcast the desirability of wheat foods, and to place gas or electric toasters in every possible home, to add the attractiveness of good toast to the appetite appeal of baked products.

They are introducing a kind of toast that has been conspicuous for its absence in America since grandfather's open fireplace was replaced by the city's apartment's gas range or electric heating device. It is rich, golden brown toast, with caramelized surface, instead of the black, carbonized, ashy toast that "flash" toasters made for the public.

It is three-minute toast instead of instantaneous toast, or one minute toast, to produce which has been the aim of heating device builders until the researches of Dr. L. A. Rumsey at the American Institute of Baking discovered what was wrong with grandfather's most tasty form of bread, rolls and sweet goods.

It was toast that reverted back to its famous original, and was accomplished through the rebuilding of toasting devices under a broad form of co-operation between the baking industry, the Wheat Council of the United States, and the electrical and gas appliance manufacturers.

Wherever you are, you either have already or will later take part in a toast and toaster campaign. Otis B. Durbin, chairman of the Kansas City Toast Campaign Committee, has written a report on what Kansas City folks accomplished, and how they did it. Because a record of achievement is a better form of telling a story than declarative form, this record of Kansas City service is published here.

It is to furnish guide signs to all who may follow along their road.

The Newspaper Campaign

The Kansas City Eat More Toast campaign opened Sunday, Feb. 3rd, with full page advertisements in the three daily papers, not only carrying the announcement of the campaign and appealing to the patriotism of the people of this territory, but also carrying a number of ads of industries handling food products that are directly or indirectly eaten with toast. This full page spread appeared again Tuesday evening in the Kansas City Star and Wednesday morning in the Kansas City Times, with new cuts and different reading matter. The same ads will appear in the Kansas City Post Thursday, the 7th, and the Kansas City Journal, Friday, the 8th. New advertising matter will again appear in all three daily papers Sunday, the 10th. Considerable favorable comment has been heard on all sides in regard to this kind of advertising.

In addition to the daily papers, ads were carried in the three denominational weekly newspapers in Kansas City, notably by the Protestant paper, The Church World, the Catholic Register, which is the Catholic paper, and the Jewish Chronicle, which is the Jewish paper. These religious publications gave us plenty of free space and told the story of toast just as handed to them. Some advertising was also done around our announcement ad in these sheets. Ads were also carried and the story of toast told in the Kansas City Restaurant, going to all the restaurants and hotels, the Ad Club News, the Kansas Citian, which is the organ of the Chamber of Commerce here, the Kansas

City Blue Diamond, which goes to over 3,000 members of the Kansas City Athletic Club, and the campaign has also been mentioned in various other smaller house organs of firms, etc.

Out on the Air

Special publicity was given us by the Kansas City Star radio station, WDAF, in allowing Otis B. Durbin, chairman of the toast campaign, to broadcast Dr. Rumsey's Story of Toast on Tuesday evening, the 5th, at six o'clock, and Dr. Waters, editor of the Weekly Kansas City Star on Thursday evening, the 7th, whose subject was "Making a Home Market for our Surplus Wheat." One of the very important things that has happened in the way of publicity was the fact that the president of the National Preservers Association, at their national convention last week, devoted a half hour to the subject of toast and its use with products such as jams, jellies, molasses, honey and preserves. The president of the Association is Mr. Geo. P. Williams, who is a resident of Kansas City and president of the Bliss Syrup Refining Co. here. Mr. Williams is not waiting for the members of his association to take the matter up with him about toast, but has written every member of their association about the Kansas City campaign and the manner in which they should tie up with it.

Wagons With Banners

All bakery wagons this week are carrying banners advertising toast and every grocery store has been supplied with window strips suggesting the eating of toast with other foods, such as ham, bacon, eggs, preserves, milk, etc. Several of the butter companies have incorporated toast in their ads and bakers, millers, and others interested are carrying overlays on bill boards, as well.

We have four window displays running in Kansas City, one in the front window of a large bank at 10th and Grand, where we have a young lady toasting bread all day long and serving butter toast with preserves, all of which have been donated by the bakers, butter men and the Bliss Syrup Refining Co. Toasters were lent to us by the Light & Power Co. Similar demonstration is being made on the Kansas side and at the Gas Company two young ladies are demonstrating toasting of bread by gas, one in the front window and one in the main store of the Gas Company. They are doing a thriving business, as the fresh toasted bread, with rich butter and preserves, is very tempting during the cold snap we are having here.

Parent-Teachers' Help

Last, but certainly not least, the Parent-Teachers Associations are allowing us to make toast demonstrations at their regular meetings, where we are furnishing the butter, bread and preserves, some of the ladies doing the toasting and serving and talking about toast as one of their subjects of discussion at the meetings. We have had fine co-operation from the Council of Parent-Teachers Associations and expect to serve them refreshments during the next six weeks. This has brought about demand from churches, Sunday school organizations, bazaars, etc., for us to demonstrate bread toasting and furnish buttered toast and preserves as refreshments, and we are going to take care of every call. Although this is only the third day of the campaign, we have booked three such meetings, the first one at which sixty-five ladies attended, the next one 155 and the third one, which will be later, is estimated over 300. **The bakers are supplying the bread, a couple of butter men the butter, and the Bliss Syrup Refining Co. the preserves. The**

Light & Power Co. are also lending us a couple of large toasters for this work.

It seems the proposition gathers momentum as time goes on, and I believe that more publicity will be forthcoming from the newspapers from now on. Numerous suggestions are being offered us in the way of further advertising, and it is likely some efforts will be made continuously by the different industries here. I am quite sure that such would be the case if the Wheat Council had a branch here with somebody to take active charge of it and run it right.

The suggestion that the Wheat Council organize regionally has fallen into fertile soil. Harrison Fuller, its director, is now working on such a plan.

Toast—Toasted with Gas

ONE of the most attractive folders we have ever seen on the subject of wheat foods was published in Boston by the Boston Consolidated Gas Co. It brought to bear on the task the experience of the advertising experts of this company, and so added unusual attractiveness of pictures to well worded text.

One page was given up to toast menus carrying the foods that may be eaten with toasted bread or rolls—creamed eggs, chipped beef, minced or creamed chicken, creamed fish, melted cheese, poached eggs, honey, and preserves.

Another page describes the manner in which crisp toast, well spread with butter, “adds relish to almost every luncheon dish.” A picture shows a mother spreading a toasted sandwich with jam for her boy’s after-school tid-bit.

A third page describes the toasters offered by the gas company for gas ranges. One at 35 cents is a wire toaster, another with a turning device to handle four

slices at once, is priced at 50 cents, and a third, a “duplex toaster” is priced at \$1. It toasts both sides of a slice of bread at once.

“To get brown, crispy toast with a soft interior” the folder urged, “cut your slices thick and toast over a good flame.

“For toast that is crisp and dry throughout, cut the slices thinner and toast over a slow flame. Toast is more delectable (Bostonese for delicious) when the crust has been cut off from all four sides.”

No wonder the gas company sold an enormous number of toasters during gas week.

New Equipment

Probably no industry is moving so fast as the baking industry in the matter of new equipment, involving new inventions and baking methods. A well known oven builder, during a visit to the American Institute, described a new oven he was constructing. It was the ordinary size for the retail baker, but it was built on a “step along” basis,—a variation of the traveler idea,—so that the bread could be withdrawn from the oven without the use of the peel.

Retail bakers are going to have a chance to see in Brooklyn, N. Y., during the week of June 2, all of the latest improvements in machines especially adapted to small-bakery use. A Bakery Exhibit is planned in which the New York State Association of Manufacturing Retail Bakers will co-operate with the Retail Bakers Association of the Eastern States. They have obtained the use of the big Twenty-third Regiment Armory, and have an energetic joint committee at work, which includes all branches of the industry in its membership. This exhibit should prove of great educational advantage to every baker who can attend.

TOAST
IS
Good Food

TOAST
Makes
Other Foods
More Tasty

MAKE
TOAST
BUTTER, EGGS, MEAT,
JAM, MILK and COFFEE
A Part of Every Meal

Promoted by the United States
Wheat Council.

Good Butter
MAKES
TOAST
BETTER

Ham or Bacon
Sandwiches
Toasted
For Deliciousness

Perfect Bread
Makes
PERFECT
TOAST

Wagon Banners For Your Toast Week

Banners are to be made of cotton cloth, 3 feet x 2 feet, with brass eyelets. Cost about 20 cents each. Window strips should be 20 inches long by 7 inches wide.

Recognition for the Grocer

How One Far Western Baker Has Built Up A Morale Through Service and Fellowship

By ROY R. WISE

Of the Log Cabin Baking Co., Portland, Oregon

HAVE you ever stopped to think of the grocer as one who should know all about modern bread baking, and who should be kept in touch with it so that he might at all times explain its case to prospective bread purchasers?

In a Far Western city a baker prints a magazine, whose news amounts, as he puts it, "to a monthly handshake and pat on the shoulder for every grocer who handles my bread."

More than that, this baker has the grocers into dances at his bakeries, and he has not missed a grocers' annual picnic in more than a score of years. How he built up this morale, what it has accomplished, and why he recommends his methods to the baking industry as a whole are told in this article. It was written at the request of this magazine.

When asked for his opinion on how to create and maintain a working relationship with grocers, H. (Holsum) F. Rittman, Founder and President of the Log Cabin Baking Co., Portland, Ore., replied as follows:

"Establishing an 'entente cordiale' between bakers and grocers is, for the baker, primarily a matter of climbing over on the grocer's side of the barbed-wire fence of misunderstanding and after getting his viewpoint, help him tear up the fence by the roots and throw it away.

"The baker must realize that the grocer is an important factor in his sales organization; he is of equal, if not more, importance than the baker's own salesmen. The grocer is at the point of con-

sumer contact and upon his relationship with the baker and his products depends the attitude with which he offers the baker's products for sale."

At just what stage of his experience, Mr. Rittman recognized the above truth is not now known. It was, however, about the time that he incorporated the present Company, in 1904, that he foresaw the time when the greater part of wholesale bakery products, especially bread, would be distributed to the ultimate consumer thru the grocery stores.

Before that time he had started laying the groundwork of a policy that has taken him and his organization far more than half way toward meeting the grocers in solving their common problems. This policy has been adhered to with a steadfastness of purpose that has won friends without number among grocers.

With the aid and assistance of Mr. F. A. Schoenlen, General Manager, and Grover W. Hillman, Sales Manager, Mr. Rittman has succeeded in permeating the entire organization with the principle of personal service. This principle has become a tradition of the plant as solid as the foundations of the building itself.

Mr. Rittman started the foundation of this principle by associating himself at every opportunity with every form of grocer activity. No matter what the occasion, he always found work for himself and organization in assisting with the enterprise so that the efforts of the grocers might be rewarded with success.

In the early days of the present Retailers Association, when that organiza-

tion was struggling for a foothold, the Log Cabin Baking Co. became and is still one of the main factors in the up-building of the Association. Aside from working for harmony among the retailers, the Log Cabin is active in assisting with the affairs that the grocers promote to raise funds for recreational purposes.

For example, take the Grocers' Annual Picnic. This is held in July of each year at one of the delightful parks near Portland. For weeks previous to the event our entire organization is busy in advertising and otherwise arousing interest in the picnic. On that day the plant shuts down so that everyone can go out to the picnic and help the grocers to have a good time. **Mr. Rittman attended the first picnic that was held nearly thirty years ago, and with only one or two exceptions has attended every one since then.**

A number of the Log Cabin organization belong to the Boosters Club, an auxiliary of the Grocers' Association. The club is composed of the leading manufacturers and distributors of food products in the Association in its work in every department. Thru this one avenue alone the Log Cabin has found many opportunities to render service to the retailers.

A Grocers' Auxiliary

Representatives of the bakery are present at all of the regular monthly meetings of the association. They furnish part of the refreshments and assist in serving them. Mr. Rittman or a personal representative makes it a point to attend every annual convention of the retailers, no matter in what part of the state it may be held.

During the war, the Grocers' Association, acting in accord with the Food Administration, appointed a bread committee to confer with the bakers on ques-

tions of policy affecting their mutual interests. The spirit of get-together that Mr. Rittman had fostered thru all the years, bore fruit during that period when bread at times was one of the most paramount questions. **The grocers thru this committee learned the bakers' side of the question and were then in a position to intelligently explain the situation to their customers.** This committee is still in existence, and though having but little to do these days, it is a handy medium to have around were any question to arise concerning the marketing of bread. As this is written, a membership drive is under way to bring more members into the Retailers' Association, and every one of our salesmen is an active solicitor among grocers who do not belong.

Among Individuals

Thus far we have treated the contacts as established with the grocers as an Association. We will now leave them and turn to the relationship with them as individuals.

Early in the last decade the Log Cabin Baking Co. initiated a program of bringing the public into the plant to show it just how and under what conditions its daily bread was made. One night in each week was set aside for the general public and one night for the grocers and their clerks and families. The public was invited thru newspaper advertising and the grocers were extended personal invitations that had as their substance the thought that, "you are selling our goods for us, you are in effect our representatives to the buying public, and as such you should acquaint yourself with the way your products are made so that you can discuss them intelligently with your customers."

The response was gratifying to say the least. The grocers and their clerks came and the reception tendered them brought

home the fact that they were indeed a part of this organization and were so respected.

The Public Be Told

These visitors' nights are still a part of the Log Cabin's policy of "the public be told" although more than twelve years have elapsed since the first one was held. The building program just completed included a large assembly hall to be used for entertaining the visitors as well as for the social affairs of the employees.

The personal service idea as extended to the individual grocers includes them in the merchandising schedule as well as in many other directions. For example, our advertising appeal, while directed in the main to the consumer, ties in with the grocer also. Realizing the effect of advertising at the point of sale, a dealers' advertising service has been adopted as one way in which to assist the dealer in getting over the message of our products. **Expert window trimmers are employed who go from store to store installing artistic window and interior displays. No aid that will relieve him of part of the selling burden is withheld.**

Window Trimming

The day that a window or interior display is reported by the trimmers to be complete, sees a letter go out from Mr. Hillman thanking the grocer for the opportunity that he has provided for displaying the advertising matter. Contrast this with the thought expressed in a statement noted in a late trade paper, "the grocer should thank the baker for advertising his goods for him." On the contrary, the grocer is selling the goods for the baker and the advertising helps the latter as much, if not more, than the former.

In June, 1922, "Crusts and Crumbs," our house magazine, was extended to in-

clude the grocers within its list of readers. "Crusts and Crumbs" has nothing to sell but the personality of the plant. **It is, in effect, a monthly handshake and pat on the shoulder** going out to all the links in the chain of distribution. Its columns endeavor to carry messages that will assist the dealer in handling his affairs along the line of least resistance. One department is set aside for items concerning dealers alone, but any activity relating to individuals that may be of interest to others in the retail grocery trade finds space somewhere in the paper. In this way the dealers in many respects have been brought closer to the house. There are many members of the house organization and dealers who have never met personally. But, thru the medium of the house paper, they have come to know about each other, and this has gone a long way toward cementing the relationship.

The foregoing has been offered as an outline of the principle of service as laid down and followed by Mr. Rittman and his associates. Nothing would be gained by going into all of the details that have developed from this main principle. They are the points that have to be worked out to apply to individual cases, but the principle will be the same no matter where it is used.

What has been shown, however, will indicate the way to go about getting acquainted with the retailers and having them get to know you. This contact must be established before any great strides may be accomplished in building confidence. **Confidence and a belief in your reliability will come from a combination of getting acquainted, readiness to see the retailers' side and a desire to help with their problems, both individually and collectively.**

Those small, apparently trifling, items of personal service that mean so much to

the man who receives and so little to the giver, smooth out many bumps in the road to personal regard.

Finally—do not lose sight of the fact that your retailer is an important part of your sales organization, and, furthermore, don't fail to let him know by your treatment of him that you recognize him in that light.

Service is THE fundamental Law of Success.

Permanent Toast Work

IN Pittsburgh, Sam S. Watters, veteran of bakery enterprises, is leading the forces working for the upbuilding of public confidence in wheaten foods. Just now he is centering upon the toast campaign as one way of getting the people into closer contact with the baking industry. He faced the problem of spending all the money the bakers and allied interests could raise in one big toast supplement, or running a weekly page of toast, toaster and baked goods advertising.

Mr. Watters decided that the weekly page made for permanency and the plan has been adopted. A page of advertisements to run weekly for a long period has been signed up. Mr. Watters himself tells the story in an interesting fashion. It is printed here for the guidance of any other community that may be interested:

"We have arranged with the Congress of Women's Clubs who will write regularly for these columns, and we are looking for quite a little interest over a period of weeks.

"Our campaign is by no means dead. We have spent in the neighborhood of \$6,000 and on the whole feel that most bakers are pleased. Our \$1.00 checks, of which we have packed 1,000,000 in our

loaves of bread, will be redeemable at full face value on the purchase of one standard toaster at any co-operating electrical dealer's store.

"We are about to launch an essay contest fostered by the Home Economics Department of the Congress of Women's Clubs and indorsed by the school superintendent. The subject of the contest, which will be for the girls, will be "What Help Are You In the Home." There will be four groups ranging from ten to eighteen. Each girl participating will be required to spend at least five hours per week in some household duty such as cooking, washing dishes, minding minor children, etc. The mother will be required to sign a blank certifying her willingness for the child to enter and that she will see that the work is performed. The contest will run for eight weeks, six weeks of which must be spent in some of the home pursuits. There will be twelve prizes in each group,—\$10, \$5, and ten \$1 prizes. On the backs of all the forms and literature the Congress of Women's Clubs will feature toast under suggestions or recommendation affecting home economics. We feel that we will get unlimited newspaper support from these efforts, as it is an attempt to interest our girls in household duties.

"Women's clubs are very much interested and are lending splendid support. We could not ask for better support from them. If the toast campaign has done nothing else than enable us to become better understood by the club women it has been, for that reason alone, well worth the effort."

I am glad to keep in contact with the work of the American Institute through its bulletins. I find the work there is very interesting.

Walter C. Hughes, Secretary,
National Confectioners Association.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

Published by the
AMERICAN INSTITUTE OF BAKING
1135 Fullerton Ave., Chicago

Entered in the post-office at Chicago, Illinois, as second-class matter, under the act of August 24, 1912.

Price, Fifty Cents a Number; Five Dollars a Year.

FEBRUARY 15, 1924

We Work Together

***To win through quality production
and the utilization of scientific research
a welcome for two loaves of wheaten
bread for every one that now finds favor.***

Now and in September

AS WE advance into the month of famous birthdays, the memory of George Washington leads us reverently over the sacred hills of Valley Forge. We stand in front of that National Shrine, the Washington Memorial Chapel, and wish that facilities would permit the holding of our next convention at that place so that each of us might receive the inspiration that must come while standing on that ground hallowed by the blood of martyrs. At the same time we feel that it is not too early for members of American Bakers Association to plan a visit to that memorable spot when at Atlantic City in September. We move across the intrenchments to the Congressional and read with reverence the works of Henry Armit Brown:—

“And here
In this place
Of sacrifice
In this vale of humiliation
In this valley of the shadow
Of that death out of which
The life of America rose

Regenerate and free
Let us believe
With an abiding faith
That to them
Union will seem as dear
And liberty as sweet
And progress as glorious
As they were to our fathers
And are to you and me
And that the institutions
Which have made us happy
Preserved by the
Virtue of our Children
Shall bless
The remotest generation
Of the time to come.”

Having read, we wonder what each and every one of us are doing to make the progress of the baking industry as glorious as has been that of the other institutions which form this great nation of ours.

RAYMOND K. STRITZINGER,
President.

Cooperation

IT WAS disappointing to find, here and there, groups of bakers who saw evil in the toast campaign and became alarmed lest the movement “affect the sweet-goods market.” Such fears will hardly be realized. Coffee rolls are much more inviting when toasted than when untoasted, and if electric or gas toasters could be put in every home, householders would soon find their favorite toasts among all of the baked products. In one city an electrical dealer who had been asked to cooperate, made hundreds of handsome window stands advertising toast—and his toaster. Some bakers met his distributor with hostility and rebuff, and thus demobilized one splendid cooperator who had planned to glorify toasted wheat foods in over a million messages that must go inside home doors. The messages were to be printed on gas and electric light bills.

Nearly all industries whose cooperating units are now working splendidly milled their way through the doubts, suspicions, and jealousies that thwarted such efforts. Milk men say it took their industry eight years to pass through. The baking industry is only three or four years along its way, and it need not feel discouraged at such temporary setbacks. More contacts on both sides will clarify the cause. If the leaders had been better informed by sweet goods men of their fears they could and would have gladly stressed sweet goods for toast rather than bread alone. The great thing is that the industry learn to cooperate, and that means that every cause agreed upon must be so directed that it serves all and harms none. It was believed that this was one movement that did so, and that all who come close enough to inspect its results will find themselves in agreement with this view.

Radio's Miracle Day

THERE never was such a day as February 4 for Radio. It will stand out in the history of this new miracle worker. Wires went down, trains stalled, news dispatching sources failed. Then Radio's voice came out into the storm. Northern Wisconsin was heard in Chicago telling Omaha where trains were stalled and steamless. Omaha was heard relaying the news to Chicago. Folks everywhere learned the news in their homes before their newspapers got it, for reporters took to radio station to broadcast the stories they could not send to their home offices in any other way. Thus Chicago spoke out upon the air the news for next morning's Omaha, Denver, and Far Western papers.

It is interesting to note that William H. Korn is a radio fan in Davenport and is keeping his local broadcasting station well supplied with fresh data about wheat,

and its baked form of food. Bakers everywhere should have receiving sets; they give fresh contacts with the broad, broad world, and much news about wheat and baking.

Coming Along

ALERTNESS and curiosity have led many of our bakers to their larger success. The conference of bakery managers at the American Institute on March 17, 18, and 19 is a conference for looking intensively into the production problems of the bake-shop. Other conferences take care of merchandising, advertising, and public relations. This one is of the dough, doughy. The invitation to attend goes to every bakery in America and calls for response by the production manager. This invitation is what you need, Mr. Baker, to show that your representative is welcome and desired. Plan to send him, and charge the cost up to investment in Progress.

Mr. Bok's Award

MORE than is usual for a man who has retired from active business life, Edward Bok continues to keep his name in the news. He has sought out a plan to wrestle mightily with the War Lord and curb his lust for fight. Bakers may watch the work of this unusual Dutch immigrant boy, who has grown into a seasoned and most useful American citizen, with more interest if they keep in mind that he started his American career as a baker's apprentice. He started in a rather shabby Brooklyn bakery, but within a week it was the pride of the district in which it was located. And his love for beauty and cleanliness continued from his bakery days to the days in which he filled his life with honors as owner of one of America's most beautiful homes, in a most attractive Philadelphia suburb which he himself did much to beautify.

The Value of Milk In Bread

*Pioneer Results Suggest That the Great Bread and Milk Industries
Should Be Joined In Mutual Service*

By L. H. WILSON*

REPRESENTATIVES of the Department of Agriculture have formally asked the baking industry to do all it can towards using up the enormous surplus of skim milk that now goes to waste in creameries and on the farm. While other government departments drive at the baker on the score of price, as if all bread should be priced at the level of the lowest in quality, this one department sees the opportunity to join two great fundamental industries. L. H. Wilson, a manufacturer of milk products, sees the same opportunity from a different angle. His paper is printed here as an addition to the fast-growing Literature of Milk and Bread. Many bakers are coming to conclusions, from their own experience, similar to those here set forth. Columbia University, through Dr. Eddy, is taking up the same cause as a University program.

In reading an article by Dr. McCollum, I find him mentioning an old Hindu proverb: "A man may live without bread, but without buttermilk he dies." This, while being a proverb, comes close to the truth, as is illustrated by bulletins and articles released by your National Association at Chicago. I refer particularly to the experiments and charts showing results of feeding animals bread made with and without milk.

During the year 1923, figures will show a production of something like 100,000,000,000 pounds of milk on American

farms. This milk will be distributed, in consumptive channels, about as follows:

45.6	Consumed as Bottled Milk
36.2	Consumed as Butter
3.7	Consumed as Milk Products
3.4	Consumed as Ice Cream
3.6	Consumed as Cheese
4.3	Consumed by Calves and Pigs
.03	Consumed as Powder
3.0	Wasted
<hr/>	
99.83	

In comparing these figures year by year, there appears to be a tendency toward increasing the consumption of whole milk, which has cut to a degree the amount or percentage of the total used in other products—at the same time, the total milk produced, has in the last four years, increased from ninety billion to one hundred billion. Therefore, it is easy to visualize the marked increase in consumption of milk products of all kinds.

Joining the Industries

To get an idea of the possibilities of this industry, when it is joined with the baking industry, we will take for granted that there are 75,000,000 barrels of flour used in commercial bakeries a given year. If all of this bread was milk bread, according to the Government standard, it would take three per cent of the total milk produced in the United States, or 3,000,000,000 pounds; and then if we care to go a step further and make a "super bread" by using all the milk that can be usefully incorporated in the loaf, your industry would use more milk than is used in the manufacture of all the evaporated and condensed milk and ice cream

*In an address before the Indiana Bakers' Association at Indianapolis.

during a given year. There is no reason why this should not be done. It is very pertinent, at this time, especially on account of the apparent distress of the wheat farmer. If we can induce this farmer to diversify and to produce the 3,000,000,000 pounds of milk necessary for our loaf of bread, we not only can secure an increased consumption of our bakery products, but we can, at the same time, eliminate to an extent, the political and economic unrest of the farmer which is so apparent. Your association is alive to this opportunity. I do not believe, however, that either of our industries realizes it fully or is taking the best advantage of the tools placed in its hands.

Milk and Bread

The production of milk is one farm activity that has not been and probably will not be overdone for sometime, in that our consumption of milk nationally is considerably below our Canadian and European neighbors, and is only about one-half what it should be. To return to the question of milk production, it may be well to explain briefly the process of manufacture of the several milk products that can be used in the bake-shop.

We will take first evaporated milk. Some are at a loss to distinguish between condensed and evaporated milk. This is very simple if you will remember that evaporated milk is preserved by heat or sterilization, while condensed milk is preserved by sugar. Evaporated milk is preserved in much the same manner as tomatoes, while condensed is kept similarly to a canned fruit. Evaporated milk, to be thus called, is all of one grade—one United States Standard as regards milk, fats and solids. Whole milk is used entirely in its manufacture. A given quantity of evaporated milk, plus a given quantity of water, will give a resultant liquid that is a trifle above the legal

standard of whole milk. For the baker, it is my opinion, that evaporated has a very marked advantage that is not recognized, namely: the shortening power. It is the practice of the manufacturer of evaporated milk to emulsify, by homogenization, the milk used. This is simply subjecting the milk to a hydraulic pressure before it is canned, which pressure breaks up the butterfat globules to an extent that precludes any possibility of their congealing into a mass at the top of the can into a cream line. This leaves the content of the can uniform throughout.

Butterfat, or any fat, for that matter, shortens only to the extent that its body is broken up in the body of the whole. By homogenizing, therefore, the butterfat is broken up into so many particles that the total fat surface is increased many, many times, and this cannot but be a very marked advantage to those using milk in this style.

You who are using or have evaporated may not have realized this, or having realized it, did not appreciate the reason. In preparing fresh milk for evaporated the process is simply that of boiling out under vacuum approximately one-half the water, after which the resultant product is homogenized, standardized, canned,—then sterilized.

Sweetened condensed milk is all preserved by the addition of sugar, the better manufacturers paying a premium of from 10 to 15 cents per hundred for the best grades. The purer the sugar the less liability of spoilage or fermentation in the finished product. All sweetened condensed milk contains a minimum of 42 per cent sugar and 28 per cent milk solids. In the case of sweetened skim milk the milk solids are all skimmed milk solids, while with the 5 per cent or 8 per cent article the skim milk solids will

be either 23 per cent or 20 per cent, respectively. The 5 per cent is partially skimmed, while the 8 per cent article is prepared from whole milk. Sweetened milk is not homogenized, for while it can be done, the trade generally desire a heavy body and the homogenizer would destroy this. Sugar is added in the form of syrup to the raw milk before the process of evaporation. Sweetened condensed has been favorably used by a great number of the larger bakers. A great many small bakers have not used sweetened condensed milk on account of the stocks they would have to carry and the irregularity of service by freight from the milk manufacturer.

However, at this time in Indiana, at least, this difficulty is overcome on account of deliveries of small quantities being made in 10-gallon cans which move in passenger train service by baggage.

The milk manufacturer, too, has been at fault by considering sweetened, powdered, and evaporated surplus products, and has encouraged the baker to buy them as such. As a result the baker has financed the milk man's business, has used old milk in the bargain, and has not had the good results possible. Our company, and I understand several others, who realize the possibilities of the baking trade, have abandoned this practice. It will take some time, however, for our industry to sell this service to your industry on account of the temptations some of our brother manufacturers are offering you to speculate on their surplus. The baker has one advantage in using condensed or evaporated over other milk products, in that the milk manufacturer can standardize the acidity of these products, so that the baker will not have the liability of a longer or shorter fermentation period because of different batches of milk used.

The usual process of powdering milk is—first, to evaporate 50 per cent or more of the water, as the first step. After this is done the resulting liquid is pumped by high pressure through nozzles built for the purpose that throw the milk in a very fine spray into an artificially heated room where this vapor or spray dries as it falls through the air to the floor of the room. There are other processes that are claimed to be as good, but the above is about the standard process. Due to the danger of rancidity and oxidation, milk manufacturers have been very timid in venturing into the powdering of whole milk; however, it is believed that this difficulty can be overcome and some companies even now claim a merchantable article of this sort. Its manufacture, however, is not general, skim-milk being manufactured in the main.

Milk's Chief Value

Milk contains four prime requisites for good health—protein for muscles and other tissues; fat and sugar for body fuel; minerals for bones; vitamins for growth and health.

The public is going to be guided in its selection of food primarily by the taste. However, the public today is coming to invest its money in foods that promote health and long life. You have an opportunity to cater to both of these influences without cost to yourselves, owing to the recognized fact that milk bread is more palatable, keeps longer and is more pleasing to the eye; last, but not least, remember and recognize the great army of women in this country, in welfare societies, clubs, teaching domestic science, and doing extension work in the field under different government departmental heads. These teachers are not basing their arguments on the chemical properties of either bread or milk, but upon actual feeding tests and observations of

diets of human beings, as well as animals held for the purpose. This force of women is very effective, as a most casual investigation will show; they are going to become more and more so, if we of the milk industry and you of the baking industry, work with and for each other toward the end of giving better and better values for the public's money.

Milk and cream together, either by themselves or in combination with other food-stuffs, make up about one-sixth, by weight, of all the food eaten by the average American family. Milk supplies in particularly convenient and usable form materials that children need, if they are to develop strong, normal bodies; too, it is an excellent food for the adult. On the other hand, there probably is no other article of food that is so frequently placed on the table or takes so prominent a place in the average diet, as bread. And inasmuch as bread is such a prominent food, it goes without saying, that in order to keep the faith and in order to maintain your business, you have, of necessity, to prepare a bread well made, well baked and well cared for, and one that will give your trade, really your friends, a well balanced food.

Homes and Machines

ON one hand women are deserting the home; on the other hand the factory is despoiling the home of its economic functions. A little over a century ago, practically all industry was carried on in the home and each home was sufficient, economically, unto itself. But with the introduction of the factory system, from 1812 to 1850, one process after another was transferred from the home, until today there are but a bare dozen or two home industries, and even these are feel-

ing keenly the encroachment of the factory.

"Home baking, for example, is rapidly being replaced by commercial baking, which has in the past twenty years trebled its capital, its number of establishments, and the total value of its products. In 1880 there were 6,393 establishments, employing 22,488 workers and capitalized at \$19,155,286, while the value of the products for that year was estimated at \$65,824,896. In 1900 the number of establishments had risen to 14,917, employing 60,271 workers and capitalized at \$81,049,553, with a total value of products estimated at \$175,667,348. During the same period the population had increased only by one half; commercial baking has therefore grown six times as rapidly as the normal course of events would seem to indicate as necessary. Home laundering is being replaced by the steam laundry which employs six times as many workers in 1900 as in 1870. Home butter and cheese making has been supplanted by the commercial manufacture, which has, during the past century, increased seven fold."

The above is by J. Lebovitz, economist of the Library of Congress. The interesting thing about it is that it is not a recent utterance, but was published, with its true aim at the decade lying just ahead of the writer, in the *Journal of Home Economics* for April, 1911.

The day is near when all bakers and flour mills will see the need for sending students to the American Institute of Baking. I am interesting all young bakers I can in taking the Institute course, for it teaches them how to keep up-to-date in the industry, even in a little shop.

—S. I. Bagwell, Oklahoma City.

Wheat As One of the Grasses

Its History Shows an Interesting Story of Evolution Under Man's Directing Care

BY DR. L. A. FITZ*

Of the Fleischmann Research Laboratories.

WHEAT, rye, and barley are included in the tribe of the grass order called *Hordeae*. Wheat and rye are still more definitely located in the subtribe, *Triticeae*. There are in cultivation eight groups of wheat generally recognized with botanical names and relative ranks, according to Hackel, as follows:

Triticum	{	monococcum, Linn., einkorn or one-kerneled wheat	{	dicoccum, Schr., emmer spelta, Linn., spelt
		sativum, Lam.		vulgare, Vill., common wheat compactum, Host., club wheat turgidum, Linn., poulard wheat durum, Desf., durum wheat
	{	polonicum, Linn., Polish wheat		tenax

We are interested principally in the common and the durum wheats.

From the beginning of botanical classification there was a tendency to regard different forms of wheat as distinct species. Later writers adopted a more reasonable view and have recognized comparatively few species, but the subdivisions of *Triticum vulgare* are regarded as varieties.

Wheat grown in the United States shows a great diversity of type. This is but natural since wheat has been grown in all the forty-eight states, which covers a wide range of environmental conditions. There are at least two hundred distinct varieties known. Some of these are of local adaptation, while others have wide adaptation. This adaptation is an important factor as it affects yield, and consequently, profits. Hence the choice of variety is important and is given careful consideration by the growers.

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"Classification of American Wheat Varieties," by Ball and Clark is the best and most recent work dealing with this subject. The classifications made are based on much painstaking work, including over twenty-five thousand plantings in classification nurseries in widely separated portions of the United States. The bases of classification are morphological and physiological characters. Under the former are included plant, stem, spike, glume, shoulder, beak, awn, kernel, germ, crease, cheek, and brush characters, while under the latter or physiological characters are productivity, milling and bread-making value, resistance to low temperature, and resistance to disease.

The classification of commercial wheats based on kernel characteristics divides the market wheat into five great classes or types—namely, hard red spring, durum, hard red winter, soft red winter, and white wheat. The first four classes are further divided into three subclasses each, the percentage of hard and vitreous kernels being the basis of subdivision in the hard wheats. Each subclass is still further divided into six grades, including sample, the basis for separation into grades being quality, condition, mixture or foreign material, and test weight. Some attention is given to kernel characters, but comparatively little to the physiological characters of milling and baking quality, except as these may inadvertently be involved in the subclass and in the numerical grade assigned on account of quality, condition, mixture, or foreign material, and test weight.

We are interested primarily in the milling and baking or the bread-making values

of these wheats. The ultimate relative market value of these wheats depends upon the estimation of milling and baking value after making certain physical and chemical tests.

There are a large number of varieties included under each class of wheat. Some of these varieties are well known throughout the whole section producing wheat of this class; other varieties are known only locally.

Hard Red Spring Wheat—Of the hard red spring varieties, Fife and Bluestem have been perhaps best known and most widely distributed, but are now being rapidly displaced by Marquis. The Fife wheat of this country dates back to 1842, when David Fife, of Otonabee, Ont., received from a friend in Glasgow, Scotland, a small package from a shipload arriving from Danzig, Germany, but supposedly of Russian origin. Later investigation indicated that the wheat originally came from Galicia. There have been many synonyms, such as Red Fife, Scotch Fife, Canadian Fife, Powers Fife, Wellman's Fife, etc. It is a hard red spring wheat with a short kernel having a wide, deep crease.

A number of different varieties of wheat have borne the name Bluestem, but the particular one referred to in the Dakotas and Minnesota is a hard red spring wheat with glumes pubescent and kernels narrower and longer than Fife. It shows excellent milling and baking qualities.

Marquis is of hybrid origin, a cross between Hard Red Calcutta and Red Fife, made by William Saunders. It is a high yielding, early maturing variety of the Fife type, and one of our best varieties when judged from the milling and baking standpoint.

Hard Red Winter Wheat—In the hard red winter wheat class, the varieties Turkey, Kharkov, and Kanred are best known and most widely distributed. Turkey was brought into south-central Kansas in the early seventies by the Russian Mennonite

settlers. The plant is very winter-hardy and drought-resistant, giving good yields. The kernels are long, hard, dark red with tight crease. This variety is especially prized for its high milling and baking value.

The Kharkov variety was probably originally identical with the Turkey, although it comes from the province or government of Kharkov, about two hundred miles further north than Crimea, the original home of the Turkey.

Kanred is quite similar to Turkey, but somewhat more winter-hardy and rust-resistant. It is the product of a single head selection from the Crimean variety, made in 1906 by H. F. Roberts, of the Kansas Agricultural Experiment Station. Samples of Kanred and Turkey grown under the same conditions have been subjected to milling and baking tests, with practically identical average results. It may be interesting to note here that John H. Parker, of the Kansas Agricultural Experiment Station, has made some crosses between Kanred and Marquis which are very promising. If he has succeeded in combining the good qualities of both varieties so as to secure an early, rust-resistant, high-yielding wheat with the best of milling and baking qualities, such result will be a real and worth-while achievement.

Soft Red Winter Wheats—The soft red winter wheats have been most widely known through such varieties as Fultz, Fulcaster, Mediterranean, and later varieties such as Jones' Winter Fife, Mealy, and Harvest Queen. These varieties, like those of the hard wheats, represent both bearded and beardless types. The chief difference between the hard and soft wheats is the difference in texture of kernel. The endosperm of typical kernels of soft wheat is entirely soft and mealy or starchy, while that of typical kernels of hard wheat is hard and horny or vitreous throughout. However, each class produces wheats which

approach the other class until there is an overlapping in kernels that are semi-hard.

White Wheats—The white wheats are quite widely distributed throughout the United States, and are represented by a large number of varieties, some of the most important being White Australian (also known as Pacific Bluestem), Dawson's Golden Chaff, Gold Coin, Defiance, Big Club, and Little Club. A large number of the wheats of the Pacific coast and the inter-mountain area belong to the white wheat class. These whitekerneled varieties are easily distinguished from the red wheats by their appearance, and also, as a rule, possess lower milling and baking qualities.

Durum Wheats—The durum varieties belong to a class distinctly different from the common bread wheats. The plants all have the spring habit of growth, the leaves have larger, broader blades, and the spikes are compact and very heavily bearded or awned. When true to type the kernels are very hard and horny. In all but a few red varieties the typical kernels are clear or translucent and generally referred to as amber colored.

The durum wheats have been widely grown in the United States only during the last twenty years, and on account of their drought-resistant qualities are particularly adapted to the arid portions of the western spring wheat States. The two best known and most widely distributed varieties are Arnautka and Kubanka.

Variations in Wheat

From the wheats belonging to the five great classes, the miller selects and blends until the mixture going to his rolls will produce a type of flour that will satisfy his customers, and his big problem is, once he has his product established, to maintain a uniform quality from day to day and week to week throughout the year. This is no easy task because of both physical and chemical variations in his raw product. He

has to contend with varietal differences within a given area and, what is usually more important, he must deal with differences within a given variety due to climatic and soil conditions.

In some states, such as Ohio or Pennsylvania, the variations in climatic conditions will not be great and the varietal differences will be more manifest. In states like North Dakota or Kansas, where the rainfall may vary from over 30 inches in the eastern to less than 19 inches in the western part and the altitude also increases as the rainfall decreases, the variations in composition due to climatic difference far exceed those due to variety.

Variation in Protein Content—The amount of protein in relation to carbohydrates is the factor showing greatest variation and, as this corresponds very closely to the amount of gluten, it is a most important factor. The soft red winter wheats and the white wheats, each considered as a class, average considerably lower in protein than the hard red wheats or the durum wheats, the usual range being from about 7 to 11 per cent in the soft wheats, while the hard wheats may contain anywhere from 8.5 to over 23 per cent. A limited amount of rainfall with some hot winds during the latter part of the fruiting period results in failing to store sufficient carbohydrate material to produce a plump kernel; hence the resulting kernel is shriveled, of low test weight and low flour yield, but high in gluten content. Usually this gluten is of good quality, strong yet elastic, but sometimes it is tough and inelastic, or at other times it is sticky or runny. Usually the quantity of wheat having good quality of gluten is rather limited and the miller must resort to blending wheats with glens of opposite qualities in an effort to produce a blend that will have gluten satisfactory in quality and quantity.

Yellow-Berry—While different lots of hard winter wheat consisting wholly of

hard and vitreous or flinty kernels may show considerable difference in protein content, a more marked difference is usually shown by the soft, mealy, or partially soft kernels known as "yellow-berry" hard wheat. It is also true that such wheat is lacking more in quality than in quantity of gluten.

Hackel, in describing the yellow-berry conditions, says:

"If the albuminoids so fill up the intervals between the starch grains that the latter seem to be imbedded in cement, the albumin appears translucent and the fruit is called corneous; but if the union is less intimate, there remain numerous small air cavities and the albumin is opaque and the fruit is mealy. Both conditions may occur in the same variety of wheat."

The yellow-berry, then, appears to be a distinctly physiological growth product due to certain conditions thus far not clearly analyzed nor satisfactorily explained. Authorities, after many years' investigation into the causes of yellow-berry and means of prevention, do not agree. It seems quite probable that there are many contributing factors causing yellow-berry and that under certain conditions a single factor may be the controlling one, while under different conditions the effect of this particular factor is not recognizable.

LeClerc and Yoder² in their triangular experiments demonstrated that climate has a much greater influence than soil upon the percentage of yellow-berry and upon the chemical composition.

Headden³ states that his experiments did not substantiate the claim sometimes made that climatic conditions favorably influence the development of or cause yellow-berry. On the other hand, he states that yellow-berry can be very much lessened or entirely prevented by the application of a sufficient quantity of available nitrogen; that yellow-berry can be greatly intensified or increased by the application of available potassium; that yellow-berry is not indicative of an exhausted soil; that the presence of yel-

low-berry indicates that potassium is present in excess of what is necessary to form a ratio to the available nitrogen present, advantageous to the formation of a hard, flinty kernel; furthermore, that yellow-berry is under the control of the grower. If there should be sufficient difference in the price of grain produced, he could control it with a margin of profit.

These conclusions were drawn from a comparatively limited number of experiments carried on in the State of Colorado. Whether or not these principles can be applied throughout the country seems somewhat doubtful.

Experiments carried on at the Kansas Agricultural Experiment Station show that the per cent of yellow-berry and composition of the seed wheat have no effect upon the per cent of yellow-berry or the protein content of the resulting crop; furthermore, that proper crop rotation and proper seed-bed preparation have a beneficial effect upon milling and baking value of the wheat; and that apparently some varieties are more resistant to the common factors which usually result in increased percentage of yellow-berry.

It is probably not necessary to state that crop rotation and proper seed-bed preparation bring sufficient yield increase to pay several times the additional cost of production, even though an improvement in milling and baking quality were not secured.

Bread and Coffee

We coffee men have a very kindly feeling for the bakers and it requires no great stretch of the imagination to picture a coffee ad. built around some such companionable item as "hot, crunchy, brown buttered toast." It makes my mouth water almost to think of it. We will keep it in mind and I will talk it over with our advertising counsel.

—Felix Coste, General Sales Manager,
National Coffee Roasters Association.

² *J. Agr. Research*, 1, 275 (1914).

³ *Colo. Agr. Expt. Sta., Bull.* 205.

The Coming Wheat Deficiency

*It Calls for Science In the Bakeshop and Special Training for
The Production Manager*

By DR. CARL L. ALSBERG

Of the Food Research Institute, of Stanford University

Carl Alsberg is a scientist and acute observer who believes that industry is entitled to all the knowledge that men of science can devise. Just as Louis Pasteur hunted up brewing workmen at Lille, France, when he discovered the enormous role yeast plays in making beer flavors, and announced to them the great and now world-famous bacteriological theory, so Carl Alsberg hunts up the workers of the baking industry, when he believes he has in hand data that would be helpful to them in conserving America's hard wheats. He tells here how hard wheats are moving into the deficiency class. He tells why this means that scientific bakers must be developed. As successor to Dr. Harvey W. Wiley in the Bureau of Chemistry, at Washington, Dr. Alsberg benefitted the orange industry to the extent of millions of dollars. He enforced a rule against letting sweated, chemically ripened oranges on the market and so left the rewards for honest growers. He now works on wheat and bread problems at the Food Research Institute, founded by Secretary of Commerce Hoover at Stanford University.

IT sometimes happens that those who are engaged in an enterprise are so engrossed in carrying it forward that they do not always recognize the direction in which that enterprise is moving. Often they do not see it as clearly as an outsider who, occupying a detached point of view, is in a better position to note the trend of things. It is my thought that we, engaged at the Food Research Institute of Stanford University in investigating the entire wheat industry, of which baking is obviously an extremely important part, might perhaps see the trend of events somewhat in advance of the bakers themselves who are engrossed in the struggle of competitive business. With this thought I have come, and I venture to lay before you certain considerations on the country's wheat industry that may not have occurred in their entirety to all of you.

Judging by the complaints of the press, and in particular of the agricultural press, one is led to believe that the wheat farmer is suffering from overproduction.

This is, of course, true for wheat in general, but it is not equally true of the various kinds of wheat produced in our country. As a matter of fact, there is far from overproduction of certain kinds of wheat. Indeed, we have not enough hard wheat, wheat of high gluten content. In other words, we have a relative deficiency of wheat. The fact that, despite an import duty of 30 cents a bushel, there has been a not inconsiderable importation of hard Canadian wheat is very good evidence that such is the case. That we no longer export abroad the better grades of our high-gluten wheat is supporting testimony. The exportation of our best hard bread wheats has almost ceased. What we now export is the kind of wheat our own millers reject. It is nondescript wheat, much of it soft and producing weak flour.

To what is this state of affairs due? It is due, of course, in large part to increase in population. More people are living in the United States today than there were last year, and there will be

more next year. We consume more bread, more wheat, more flour. But the situation is not wholly the result of increase in population; it is due in large measure to increased demand of the bakers for the stronger flour which can only be made from hard wheat. This demand has become accentuated particularly since the war. Why the bakers prefer strong flours is easy to understand. Such flour gives larger bread yields. It is easier to make a loaf of the desired quality from it. Less skill is required to make good bread from strong than from weaker flour.

The Gluten Content

The result has been that many millers no longer buy wheat merely on grade and appearance, but insist upon knowing the gluten content as well. Indeed, I have friends in the milling industry who will not buy a carload of wheat unless with it comes a guaranteed analysis of the protein content, which, of course, is an indication of its gluten content. These requirements of the miller are compelling grain dealers to buy on a similar basis. I know grain dealers who, as soon as harvesting begins in the territory in which they operate, secure samples of wheat from each township, have it analyzed, and then prepare a colored map of their territory, each color corresponding to a certain gluten content of the wheat. Their agents in each township are then instructed what premiums to pay for the wheat of that township. The premium is fixed by the dealers entirely upon the protein content of the wheat. Occasionally they are fooled when a farmer from one township with wheat of low gluten content, hearing that in a neighboring township premiums are being paid, loads his wheat into his motor truck and carts it over there.

There is grave danger that the relative deficiency of production of hard wheat will be aggravated by the present agricultural depression. In many sections wheat farmers are in a bad way. This is particularly true in the Northwest, the hard spring wheat section, and to a lesser degree in the Southwest, the hard winter wheat section. Because nearly everywhere except in the Pacific Northwest and in California soft wheat growing is a part of mixed farming, the producer of soft wheat is not in so bad a financial condition. He does not put all of his eggs in one basket, and wheat is only one of a number of commodities he produces. Indeed, in some of the soft wheat country the straw is almost as important as the grain, and wheat is necessary in crop rotation. In much of the hard wheat country, on the contrary, the straw has to be burned because it has no value and cannot be disposed of otherwise.

The hard wheat farmer in many sections is a one-crop farmer. If wheat prices are unprofitable, he has little else to fall back upon. He may be forced out of farming altogether or into mixed farming. Present wheat prices are likely to bring about restriction of wheat acreage. There is grave danger that such restriction may be relatively greater in the hard than in the soft wheat territory. It is a serious national problem of the day to bring about restriction of wheat acreage without reducing the production of hard wheats. At any rate I think one cannot escape the conclusion that there is real danger that before long strong domestic wheat will be scarce and strong flour even scarcer.

The Baker's Part

It is, therefore, worth while to consider how such a situation may be met if it arises, as I myself believe it is bound to before long. I believe the baker has it in

his power to meet the situation without hardship to himself, the wheat farmer, the miller, or the consumer, by resort to the simple expedient, which may not be so very simple in practice, of using a wider range of flours than at present. As a matter of fact, the baking of satisfactory bread is entirely possible from a wider variety of flours than are now commonly used in the United States. The American baker has, if you will pardon me for saying so, been spoiled by the ease with which he has been able, up to the present, to get for a reasonable price the best and the strongest flour.

How is the baker to use a wider range of flour? He can do so by taking advantage more than he does at present of the discoveries of the chemist. Now, what are these discoveries? They are in the main that the quality of gluten is not wholly predetermined by nature, but depends to a considerable extent upon the conditions with which it is in contact in the flour and in the dough.

What are these conditions? First, they are the quantity of mineral salts present in the flour, commonly known as ash. Now mineral salts act upon dough in at least two ways. One of these is entirely familiar to the baker. He knows perfectly well that by adding more or less common salt he can affect the texture of dough and, under certain conditions, stiffen a slack dough.

The second manner in which the mineral constituents of flour act is not so well understood by the man in the shop. During fermentation yeast makes acid. An old dough is more acid than a young dough. There is probably an ideal acidity at which any given dough will bake out the best bread. Now the mineral matter in a flour has the power of taking up and neutralizing some of the acid formed in fermentation. It acts like a shock ab-

sorber for the bump given dough by acid. Indeed, the chemist calls such mineral salts "buffers," and the degree to which they can neutralize acid the "buffer value." But the word "buffer" is only a high-brow name for shock absorber. Since the ripening of dough depends very largely upon the development of acid in the course of fermentation, it is obvious that the amounts of these mineral salts and the degree to which they act as buffers in neutralizing acid must affect the rate at which the dough ripens.

The acidity of the flour and the degree to which acidity is developed in it is the second important factor affecting the quality of gluten. One effect of acidity is perfectly well known to you. You all know that a flour freshly milled from recently harvested wheat does not produce as good bread as after the same flour has been aged or matured for some time. Now it has been pretty definitely shown that the main cause of the maturing of flour is the development in it of a proper degree of acidity. You are also familiar with the fact that aging a flour for too long a time will ruin it for baking purposes. This has been shown to be due to the development in it of too much acidity, for neutralizing the excessive acidity will improve an overaged flour for baking purposes. It is obvious, then, that to some degree the character of a gluten, its texture, elasticity, plasticity, and capacity to expand and hold gas are influenced by the mineral matter and the acidity with which it is in contact in the dough.

Everyone knows that, while the baking quality of flour depends upon many factors, the two most important are the quality and quantity of gluten. You cannot increase the amount of gluten in a flour except by blending it with another flour that has more gluten. If, however, the

statements I have made that the quality of gluten is dependent in part upon the amount of mineral matter and of acidity that surround it in the dough be true, then it should be possible to modify the gluten in a given flour when it is of poor quality so as to make it act like gluten of better quality and to make reasonably good bread from a whole series of flours that are not now regarded as good for bread making.

Variety of Flour

This is not at all a theoretical question. It has actually been done. Two cereal chemists, Weaver and Goldtrap, have been able to bake bread of equally good quality from a large variety of flour, strong and weak. They practiced no particularly difficult procedure; they merely determined what amount of water was best for each flour and what acidity of the dough for each flour gave the best results. They controlled the acidity by lengthening or shortening the fermentation period, as the case required. But this is not the only simple method of controlling the acidity of dough. It can be adjusted by adding some acid-reacting substances to the young dough, or it can be controlled by keeping the fermentation period constant and adding more or less yeast as the case requires. Weaver and Goldtrap, who are practical men, not professors in some school, were so convinced that the present method of evaluating flours is unsound that they suggested that it would be wise to drop the designation of "strong" and "weak" flour and to substitute therefor the terms "flour of long fermentation period" and "flour of short fermentation period."

Methods to be Modified

If the point of view of Weaver and Goldtrap is adopted,—and I believe that it will have to be ultimately,—then our

present methods of testing flour will have to be modified. Despite all chemists have been able to do, the baking test is still the only test that even approaches being reasonably satisfactory, but it has serious defects. Testing flour by the baking test always seems to me like trying to decide which is the better horse, a Percheron or a thoroughbred trotter. How can you proceed to decide such a question? If the test is pulling power, the Percheron wins, but if it is speed, the trotter gets the blue ribbon. So it is with a baking test. As at present practiced, the method is to adopt a standard procedure of doughing, fermenting, proofing, and baking, and this procedure is kept as uniform and invariable as it is humanly possible to make it. If the baking method adopted is one which is suited to a strong flour, then the weak flour tested shows up worse than it intrinsically is, and by comparison the strong flour better than it really is.

The Baking Test

On the other hand, if you were to standardize the test in such a manner as to bring out the best in a weak flour, it would, obviously, be unfair to a strong flour. In my opinion the baking test should not be: what kind of loaf will you get from all kinds of flour if you bake in the same manner, but, what kind of loaf will you get from a flour, if the flour under test is handled under conditions which are the best for that particular flour. Under such circumstances, many a weak flour would show up, as compared with a strong flour, much better than it does under methods of testing now in general use.

The problem of the baking of bread from relatively weak flour is particularly important to the California baker, for the reason that the wheat produced pretty

nearly everywhere on the Pacific coast is soft wheat that yields a relatively weak flour. Nearly all the wheat in adjacent territory is soft wheat. The economic course for California millers would be to grind only wheat from the nearer points. Yet millers are compelled, in order to give California bakers the strong flour which they demand, to import into the state, often from thousands of miles away, hard strong wheats instead of using wheats close at hand. These are not merely expensive premium wheats, costing more than the local wheats, but the freight charges are very high and liable to become higher as the years go on. The California baker and the California consumer, of course, pay the price. This represents a real economic waste and a serious loss to the people of California.

I have no anticipation that there is to be difficulty in getting strong flours this year or next. I am discussing the long-time trend in the wheat industry. I feel that ultimately and within our life-time it is going to be difficult to get domestic flour of the excellence you are now receiving. This, in my judgment, is inevitable. Those who start ahead of the procession to meet such changing conditions will perhaps make a killing. Those who trail will perhaps be eliminated.

The situation will have to be met by no inconsiderable change in the character of the bakeshop personnel. **Bakers trained for the trade, not merely grown up in it, will be necessary.** Some sort of **technical scientific training will have to be introduced—probably schools for bakers.** Merely sticking around a bakeshop will not be enough in the future to qualify as a bakeshop foreman. Baking, in my judgment, nevertheless, will never be a science; to a large extent it must always remain an art. There will always be room for the exercise of the skill that is

practiced by the baker today, but in the near future he will also need scientific knowledge. The question then is: will bakers get ready for the inevitable, or will they be found unprepared when strong flours are no longer abundant and cheap, the kind of flours from which almost anyone can make passable bread by rule of thumb methods?

The proposition, then, is that, while we have at present an overproduction of wheat, we have no overproduction of high grade wheat. On the contrary we are approaching a deficiency of such wheat. For this deficiency lessened production is not responsible. Growth of population accounts for only a part of it. The increasingly insistent demand of the baker for ever stronger flour is aggravating the situation. The time is approaching when this demand can no longer be met with domestic wheat. What are you going to do about it? The question is one to make us all think through the years immediately ahead.

Vitamins—and Bread

IMPORTANT chemical properties are removed from flour in modern milling. "You can get them back in bio-food," runs a patent food advertisement. It says the same of peeled and boiled potatoes, polished rice, and other foods well known to man.

The advertisement does not say that you can get them back abundantly, also, in the butter that is the almost universal spread for bread, and in the glass of milk that almost universally goes with it.

In almost every food table, bread is shown as deficient in this or that. If the test were made with buttered bread the table would show bread shining brilliantly as one of the most complete and useful foods. Butter is to bread what

cabbage is to corn beef, eggs to bacon, and onions to liver.

From "Hygeia" we take the following table of vitamin distribution through food products. Please note the vitamin content of butter, and then combine it with that of white bread to see what consolidated strength these two foods show. As bran is the ideal cow feed, it is seen that the cellulose of the wheat, with the food qualities lying close to the wheat kernel's outer skin, all come back in the butter and milk in a vastly more appetising form.

Vitamin C. is noted as lacking, still. That is the fruit juice vitamin. And it means that nature correctly led the human family to its love for a bite of apple, a drink of orange juice, and a serving of grape fruit. Bread is glad to be one of a group of fine foods, and doesn't want to be the whole diet.

The vitamin list follows:

	"A"	"B"	"C"
Bread, White (Water).....	?	+	—
Bread, White (Milk).....	+	+	?
Bread, Whole Wheat (Water).....	+	++	?
Bread, Whole Wheat (Milk).....	++	++	?
Barley (Whole).....	+	++	—
Corn, Yellow.....	+	++	—
Oats.....	+	++	—
Meat, Lean.....	to+	+	+
Beef Fat.....	+	—	—
Mutton Fat.....	+	—	—
Pig Kidney Fat.....	++	—	—
Oleomargarine.....	+	—	—
Liver.....	++	++	+
Kidney.....	++	++	+
Brains.....	+	++	+
Sweetbreads.....	+	+	*
Fish, Lean.....	—	+	*
Fish, Fat.....	+	+	*
Fish, Roe.....	+	++	+
Milk, Fresh.....	+++	++	+V
Milk, Condensed.....	+++	++	+V
Milk, Dried (Whole).....	+++	++	+V
Milk, Skimmed.....	+	++	+V
Buttermilk.....	+	++	+V
Cream.....	+++	++	+V
Butter.....	+++	—	—
Cheese.....	++	*	*
Cottage Cheese.....	+	*	*
Eggs.....	++	+	+
Almonds.....	+	+	*
Cocanut.....	+	++	*
Hickory Nuts.....	*	++	*
Peanuts.....	+	++	*
Pecans.....	*	++	*

	"A"	"B"	"C"
Walnuts.....	*	++	*
Tomatoes (Raw or Canned)....	++	+++	+++
Beans, Kidney.....	*	+++	*
Beans, Navy.....	*	+++	—
Beans, String (Fresh).....	++	++	++
Cabbage, Fresh, Raw.....	+	+++	+
Cabbage, Cooked.....	+	++	+
Carrots, Fresh, Raw.....	++	++	++
Carrots, Cooked.....	++	+	+
Cauliflower.....	+	++	+
Celery.....	*	+	*
Cucumber.....	*	+	*
Dandelion Greens.....	++	++	+
Eggplant, Dried.....	*	++	*
Lettuce.....	++	++	+++
Onions.....	*	++	++
Parsnip.....	—?	++	*
Peas.....	++	++	+
Potatoes (Boiled 15 Min.)....	*	++	+
Potatoes (Boiled 1 Hour)....	*	++	+
Potatoes (Baked).....	*	++	+
Sweet Potatoes.....	++	+	*
Radish.....	*	+	*
Rutabaga.....	—?	++	+++?
Spinach, Fresh.....	+++	+++	*
Spinach, Dried.....	+++	++	*
Squash, Hubbard.....	++	*	*
Turnips.....	—?	++	*
Apples.....	+	+	+
Bananas.....	+	+	+
Grape Juice.....	*	+	+
Grapefruit.....	*	++	++
Lemon Juice.....	*	++	+++
Orange Juice.....	+	++	+++
Prunes.....	*	+	—
Raspberries (Fresh or Canned)	*	*	+++

+ contains the Vitamin.

++ good source of the Vitamin.

+++ excellent source of the Vitamin.

— no appreciable amount of the Vitamin.

? doubt as to presence or relative amount.

* evidence lacking or insufficient.

V variable.

Visits All Around

Except for kind friends who come in from afar bringing word of what they see and hear, the editor of this magazine is for the most part a blind man groping in the dark. F. A. Schoenlen of Portland, Ore., brought in this little idea recently:

"Why don't all bakers when they go away on trips make it a business to visit with their fellow bakers? I follow this plan of visiting other bakeries in every city I get into and I find the experience of trading ideas to be very profitable indeed. I would like to recommend it to all bakers, the country over."

Prohibition

A visitor at the American Institute of Baking last year was Mr. Robert Gibson, M. A., LL. B., B. Sc., an advocate of Edinburgh, Scotland. Mr. Gibson was a member of a Commission of Scottish Churchmen, appointed to tour America in quest of first-hand knowledge of the workings of the prohibition law. Incidentally he was keenly interested in the Scottish Association of Master Bakers, and wrote for them a report on the American Institute of Baking. It appears in their Year Book for 1924

In inclosing a copy of the report on prohibition, with a wish to be remembered to American bakers who were kind to him during his special inquiry into baking conditions, Mr. Gibson notes this conclusion, as to the standing of the Eighteenth Amendment:

"There is no prospect that the saloon or public house will be seen again in the United States. The Commissioners did not meet a single individual from the Atlantic to the Pacific who had a good word to say for it. Its extinction is taken for granted by every class in the nation. The leaders of the Anti-Prohibition movement expressed themselves as emphatically on this point as the Prohibitionist.

"It was interesting to meet ex-saloon keepers who admitted the evils of the open bar, and declared that they never would vote for its return. These men were now conducting popular restaurants and were prosperous and satisfied with their new conditions. Their satisfaction was due not only to their business success but to the fact that the social ban had been lifted and their children were no longer shunned by others because of their father's connection with the whisky saloon."

This may seem to bakers as far apart from their interests. But as the saloon

collapses, bidders appear for the premises and in many places fights between chain store systems have occurred to gain the largest number of ex-saloons. To attract trade, once they have established themselves, they have offered bread below cost of production, as a "leader." In consequence newspapers have sent flurries of news across the continent that this or that city was enjoying bread prices far below normal. They have never looked into matters deep enough to find out the cause, and the role bread was playing in John Barleycorn's dispossession proceedings.

From the Outside

IF some bakers do not appreciate the work of the Institute maintained by their National organization, there are others who, looking from the outside, see great results from the work being done here. The following is from an editorial in the American Journal of Public Health, written by Dr. Mazyck P. Ravenel, of the University of Missouri.

"The activities of the American Institute are far reaching. Research fellowships have been endowed by commercial corporations putting out food products, as for example the Merrill-Soule and Sunmaid Raisin companies. Experts of the highest class are employed by them in the elucidation of problems connected with the baking industry. Foods, especially those in which the grains play a large part, are studied through their entire range. The various wheats, milling processes, flours, yeasts, milk, dried milks, oils, butter, butter substitutes, fats, and in fact everything which enters into the making of bread, cakes, pies, are carefully studied under experts. It is a well directed and earnest effort towards improving the products of the baker. Not only is the technical side brought out, but he is taught the scientific principles

underlying the best practice of his trade.

"Some of the figures presented are rather startling to the casual observer. Bread has been well called The Staff of Life and is the most universally consumed food in the world. The number of interests which are concerned directly and indirectly in the baking trade is surprising. Not only are the farmers of the country intensely interested, but the dairymen, milk dealers, cotton growers, and cotton seed oil manufacturers of various types of shortening, the packing industries, all are vitally interested in the amount of bread which the people of the country eat. Indirectly almost everyone in the world is concerned.

"The matter of health has not been forgotten by the directors of the Bakers Association and the research laboratories of the American Institute of Baking. They are teaching sanitary methods in construction of shops and machinery, the handling of doughs and the various ingredients which go into bread. They study and teach the bakers of the country the facts concerning the nutritive value of the ingredients as well as of the finished product, the influence of various temperatures, the use of steam, the cooling, wrapping and protection of bread, the handling of bread in shops and groceries, and the influences of molds and various bacteria.

"One has only to look at the table of contents of Baking Technology to realize the enormous importance and range of the subjects considered. A recent number contains a most interesting paper on how rust curtails the production of wheat, and the fight against it in various countries. While the journal of the Institute is technical and intended primarily for bakers, it contains material of intense interest for health officers, physicians, and all who are interested in the nutrition of our people."

One Bread Week

CALIFORNIA did enormously more with her BREAD WEEK this year than last year. The movement had gathered momentum and with the farmer-thrust behind bread merchandising as a means of creating more orders for wheat, the movement rolled up to really magnificent proportions. There was no necessity to force any issues. High schools were freely thrown open, business men's clubs heard the story with a will, the Mayor was a whole-hearted helper, radio broadcasting stations gladly gave a chance to broadcasters, and newspaper writers put their pens to work in the cause.

For any community going in for associated service to win friends for bread—merchandised wheat—California has developed a *modus operandi* of value. Here, for instance, is one little wrapping band that found its way onto great quantities of merchandise:

THE "BEN FRANKLIN ROLL"

As a youth of seventeen, Franklin arrived in Philadelphia with all his earthly possessions in his pockets. Being hungry, he bought of a baker "three pennyworth of bread" and received for his money "three large puffy rolls." Taking one under each arm and munching the third, he strode up town. As he arrived at Fourth and Market Streets, a young girl laughed outright at his ludicrous appearance. He later evened that score by marrying her.

THIS IS BREAD WEEK. FOLLOW
FRANKLIN'S EXAMPLE AND
EAT MORE BREAD

William Francis Ireland's Southern California Baker contains a splendid story of the way the electrical men helped make the enterprise a success. It could be obtained and spread before any local committee anywhere, to inspire its members with a story of a real success.

Books for the Baking Laboratory

DISCOVERY, THE SPIRIT OF SCIENCE AND SERVICE. R. A. Gregory, The Macmillan Co., N. Y. Illustrated with photographs and charts.

The value of research in industry has become so well understood in the past decade, and especially since the Great War fused to a common purpose every effort of inventor, scientist and artisan, that it would seem unnecessary to set in type the story of the conquest of science over matter, or the triumph of the skilled worker over the rule of thumb laborer. But the achievements of the laboratory have been so marvelous that there is no subject more thrilling than the annals of science.

Sir Richard Gregory has woven into a fascinating story the spirit and service of science. He chronicles outstanding scientific achievements and intimate biographical sketches into a series of essays which are as readable as Kipling and as thrilling as ringside wires.

Of what use is research? What is it good for? Faraday answered such an inquiry with another, "Will you tell me the use of a new born child?" And every research student, working in the seclusion of his laboratory, has the satisfaction of feeling that his labors, unproductive as they may seem to the layman who waits outside to learn the results of his investment in pure science, are building the foundations on which great industries are reared, and teaching the short cuts to profitable production.

The chapter on practical purpose should be read by every man who contributes to the support of scientific laboratories, for it shows how science, dominated by the spirit of productive application, becomes merely the galley slave of short-sighted commerce.

"Almost all the inventions upon which modern industry has been built," says the author, "would have been crushed at the outset if immediate practical value had determined what work should be undertaken."

No industry is more burdened with false knowledge than that of the baker. It was inevitable that in the slow evolution of the industry through the thousands of years the baker has labored at his bench, superstition and craft-lore became ingrained in him. He knew the art of handling his materials, he did not know the science within them. He knew the results of fermentation, but he knew nothing of the biology of yeast growth or the wonderful chemistry of gluten and starch.

The wide difference between belief and evidence, the belief of the craft baker and the evidence of the chemist baker, is aptly shown by a discussion of the common belief that the climate is changing. However firm this belief may be, scientific studies of meteorological tables shows that there has been no change in the climate in historic times.

And how similar is the conviction of the baker who has trouble with his loaves that the flour is at fault? Has he not known for centuries that good flour made good bread, and conversely that bad bread was due to bad flour? But Chemistry has shown the baker that his failures were often due to lack of knowledge of how to combine his materials, or how to control his processes.

Two men stood looking through the bars,
One saw the mud, the other saw the stars.

Through this common couplet the author drives home his purpose to visualize the spirit of science, reaching out eager hands to unveil the mysteries of Nature.

"And what," says he, "are the motives of scientific work?" "Chiefly love of knowledge and the joy of discovery." These are the motives which urge forward the scientist who is building so rapidly and so thoroughly almost every phase of modern industry.

If the reading of this story of discovery brings no more than an appreciation of the value of research and the sacrifice of the worker, it will have been well worth while. But no one need be satisfied with such rewards. The little volume will also thrill with its stories of achievement, stimulate the investment of still greater foundations in research, and satisfy the hard-headed business man that out of the laboratory of his factory may come greater profits than ever can be produced by his craftsmen.

—H. E. B.

Men and Machines

Julius Barnes is the author of two interesting papers, each of which is printed in pamphlet form. The first is entitled "The Farm Market, Limitless Industry or the Unexpanded Stomach?" The second is entitled "Machine Production and Individual Prosperity."

In the latter paper Mr. Barnes deals with the

transition through which the baking industry is now going. He tells of the significance of this change in terms of the National weal:

"When the workers see that by the process of machine invention drudgery is lifted from human backs, work is made interesting and stimulative, homes are better furnished, freedom of child opportunity is enlarged, continuity of employment strengthened, then we get the conviction of mutual interest by which employers and employees work to a common end."

"In the transformation of industry, there has come into play a change of base, an evolution as yet not fully appreciated."

"This very change of industry's structure requires more capital investment in machines and appliances. These machines require more power to run them, and the necessity of capital investment in the generation of power to supply machines, so that there rests on industry today a much larger burden of capital investment requirement than ever before, in the very interest of this sustained production."

Bakers desiring either of these papers can obtain copies by writing to the American Institute.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Studies in Bacterial Metabolism. LXVII. Carbohydrate Identification by Bacterial Procedures. A. I. Kendall. *J. Infectious Diseases* 32, 362-8 (1923); cf. C. A. 17, 2593.—As various bacteria differ in their ability to utilize various sugars, with a collection of carefully standardized organisms, carbohydrates, both as they occur naturally and after the formation of cleavage products, can be accurately identified. Impurities in sugars can be detected and mixtures can be separated. **LXVIII. The Measurement of Carbohydrate Mixtures by Bacterial Procedures.** A. I. Kendall and S. Yoshida. *Ibid* 369-76.—For the detection of small amounts of sugars, alone or in the presence of larger amounts of other carbohydrates, there are necessary, first, a set of bacteria of known fermenting powers; second, a set of carbohydrates of known purity; third, a set of standard phosphate solutions of known H-ion concentration. If the suspected material is in considerable concentration ($\frac{1}{2}$ to several %) the regular test for fermentation may be performed, using a suitable N-containing medium as a basis. If the unknown carbohydrate is present in very

small concentration recourse to the measure of the H-ion must be practiced. The identification of the carbohydrate requires a careful study of its fermentability in pure condition by the standard strains used. A concrete example is given in the identification of the sugars in a mixture containing d-glucose, fructose, mannose, galactose, lactose and sucrose. **LXIX. Carbohydrate Configuration and Bacterial Utilization.** A. I. Kendall, Robert Bly and Reba C. Haner. *Ibid* 377-83.—A series of sugar derivatives was prepared, including gluconic and saccharic acids from d-glucose, mannonic lactone and mannosaccharic lactone from mannose, and galactonic acid from galactose. These acids, in addition to the alcohols, sorbitol, dulcitol, and mannitol, provided a considerable, but not complete, series of hexose sugars and derivatives which differ merely in the character of the terminal groups. The fermentation of these substances by a selected group of organisms was studied. All the organisms utilized glucose and most of them utilized galactose. The proteus group did not utilize levulose and mannose and some strains of the cholera vibrio failed to utilize mannose. These observations indicate that a common enol formation is not an absolute prerequisite to fermentation; otherwise, the members of the group that possess a common enol group (d-glucose, d-mannose and d-fructose) would theoretically be mutually convertible and mutually fermentable. Furthermore, gluconic and galactonic acids, which cannot readily undergo enolization, are fermentable by members of the proteus group.

Studies on the Digestibility of Proteins in Vitro. IV. The Digestibility of the Cottonseed Globulin and the Effect of Gossypol Upon the Peptid-tryptic Digestion of Proteins. D. Breese Jones and H. C. Waterman. *J. Biol. Chem.* 56, 501-11 (1923); cf. C. A. 16, 2713. "Pepsin and trypsin, acting successfully in vitro, digest casein and the globulin of the cottonseed to very nearly the same extent and at practically the same rate through an extended period. The addition to the protein of 1% of its weight of the toxic principle, gossypol, known to be present in cottonseed kernels to the extent of from 1.5 to somewhat more than 5% of the estimated (N X 6.25) protein content, interferes markedly with the digestion in vitro of the cottonseed globulin by pepsin and trypsin, and by pepsin alone, as well as the digestion of casein by pepsin and trypsin."

I. GREENWALD.

Our Service Work Increases

A FLOUR miller who suddenly woke up to the great task the American Institute of Baking had set for itself through building up the quality of the output of all bakers who would submit their loaves for frequent scoring, wrote about this work to several hundreds of his customers.

He asked them if they were availing themselves of the service. That is just one little item of co-operation, as it is now being carried on by many who are thrusting the American Institute forward into greater usefulness.

It all piles up to greater results. In January, 1924, there was an increase of 22 per cent in the number of flour samples sent in for analysis. Some were from small millers who had no laboratory of their own; many were from bakers who wished to know just what was in the flour they were buying by brand.

The story as to bread samples was most interesting of all, however. Bread is scored free at the Institute, and advice is given as to how to build up any loaf that may be in need of improvement. One example will show how this service has worked out in building a quality loaf the country over.

A baker sent in a hard, heavily crusted loaf. He said he had always sought a soft, spongy loaf of tender crust. His customers desired the soft loaf, but for some time past his oven had been delivering very hard, heavily crusted loaves.

The bread was analyzed and found to be suffering from many evils of improper fermentation. It was also a straight yeast, water, and salt loaf. O. W. Hall advised by return mail that the premier way to get a soft loaf with tender crust was to put in milk instead of water in the mix, and then give it exactly the

right amount of fermentation. Detailed instructions for changing fermentation and oven conditions were sent, along with a statement of the required changes in formula. After three letters had passed a very joyous one arrived at the Institute. It stated that at last the baker was getting his ideal loaf.

The year is young yet. This work could be extended to several times its present volume before it would overcrowd the Institute's capacity. Is your bread under the careful scrutiny the Institute staff gives each loaf submitted? Many have built up their scores from 80 or less to 90 or over.

Justifying Flour

One thing the Institute Service Department is doing is rescuing flour from the blame for many evils of which it proves not to be guilty. The long list of charges against flour was added to this month when a baker reported that he was blaming flour for "oven gas." He claimed he had received some winter wheat flour; that it developed "oven gas" while baking, whereas the spring wheat flour he had formerly used developed no such trouble.

"Look for a crack in the hearth of your oven," wrote back the head of the Service Department, "for gas must be leaking from your combustion chamber to your oven. Remember most troubles come not from flour, as was once supposed, but from bakery conditions, such as the temperature during fermentation, adjustment of machines, adaptation of the formula to the kind of flour on hand, and oven temperatures. When all of these conditions are carefully watched the flour ceases to give trouble, as it will when some vital factor is overlooked."

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A New Day For Quality Bread

AS THESE words are written the Associated Press carries to all newspapers in America the message that a new kind of a convention is to be held at the American Institute of Baking. The news is that this convention is a meeting of Bakery Production Managers, who are going to consult together about better flavor in bread, more nutrition in bread, better sanitation in the bakery where bread is baked, and more service to the consumer of bread.

This meeting of Bakery Production Managers will codify and arrange knowledge about baking of the new and scientifically controlled kind. Its proceedings may well

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become the foundation of a new Book of Bread, that will be very different from its predecessors of the craft era in baking. Bakers who are not represented at this meeting should watch the trade press for its reports of this conference. Bakers who urged that it be held insist that they consider it the greatest step that the organized baking industry in America has ever taken.

They see in it a center for broadcasting all secrets about the production of Quality Bread—the kind of bread that has won for its few producers such enormous sales that their remarkable growth has become a matter

for comment and alarm lest the baking of bread gravitate to too few a number of big bakers.

From the day the American Institute of Baking was founded its backers have insisted that all research work done here be broadcasted to all the baking world—that no secrets be guarded and kept for a few. Such bakers as wished to develop research on that line had their own laboratories or were in alliance with established centers of research in the universities. That research has paid everyone now admits, save a few professional assaulters of the baking industry who profess to see too rapid a growth among too few of the bigger bakers. They have looked for the secret in the ledgers of these bakers and have sought to show legerdemain in the financing of these baking concerns. But they have not looked for the commanding factor in their sudden growth. This was the scientific laboratory at the bakery's heart and the chemist who had been installed as chief of the production department. No baker who had not tied up to Science had any story to tell of sudden growth and the cutting of a great swath through sales territories, and through the practice of home baking.

The plain fact is that women preferred to bake at home, in thousands of instances not now applicable, when the best loaf they could buy was the loaf of constantly varying quality. The craft bakery, not specially built to guarantee such control as Science now makes possible over the fermentation process, could not turn out a loaf whose quality could be guaranteed from day to day. One day at home, on which the father became irritable over "punk" from the bakeshop, shamed his wife until she baked her own as insurance against household ructions.

Now she forgets her fear. A loaf has come that is proving in many cities that

it is **the loaf** that lures the woman out of her kitchen and sends the housewife's son or daughter right past the old-time craft loaf when on a buying errand at the grocer's.

The only question is whether a few bakers or the great mass of bakers will bake the best loaf. It can never be baked by men who do not know the how, why, what, and when, of every fermentation process, and of every ingredient that may be used to increase a loaf's appetite appeal.

"I do not see how you can know anything specially new about baking," said a friend in this office only last week. He was an oven manufacturer who had been a visitor at bake shops all his life. "People have been at this baking business all their lives, and their fathers before them have been at it through every generation back to the Oldest Antiquity. They have worked out its processes. We are making too much of a fuss about the new science of baking."

But we assured our friend that he was altogether wrong. We suggested that people had been at the business of watching lightning play through the heavens through thousands of generations. And in one generation they made a salve with which to anoint springs against lightning. And that in another generation they had blessed and anointed church bells to ring out against lightning. Also that they had rubbed certain herbs on church bells to increase their efficiency. But that lightning had gone right on striking tall spires until in our own country Benjamin Franklin had run a kite up into the clouds above the Schuylkill river valley, and brought the lightning down to shock his hand.

Then had begun a new scientific battle against lightning's devastations and it had conquered. So with baking, we reminded our visitor that the old-time

baker got sour bread, and never knew why, and suffered losses from it periodically; also that he got flat bread at times, and many cripples at times. And we suggested that the quality varied from day to day just as the quality of cheese did when made by a craftsman who knew no more about the complicated bacteriological process going on in his milk than the baker did about the same process going on in his dough.

Our oven-making friend then began to take notice. A baker joined the conversation. "We have about worked out the matter of quality bread," he suggested, "we can standardize the present quality loaf and it will be the loaf of the future." He was a baker who had almost been ruined by a rope invasion two years ago because he was not quick and alert in his response to the challenge of its presence.

Another baker joined the group. He had fought for "quality bread." His story ought to be known in every home in America, for he dared to do important pioneering for the Housewife of Today. When flour became cheaper after the war he sold bread on equal terms with his chief competitor. Both had the same sales volume, practically. His competitor suddenly dropped his price to $4\frac{1}{2}$ cents a loaf wholesale, and made a loaf to retail for 5 cents. True enough, he had a cracker business which he expected would carry the bread business along as its "feeder."

But the baker whom he expected to defeat with an enormous increase in comparative sales, did not follow him down in the least degree. He began, instead, to haunt the American Institute of Baking. He wanted to know all about Quality bread and Quality ingredients. He started a fight for quality—for the best loaf of bread that Science could produce. He rebuilt his bakery to provide for accurate control of many baking

processes that could not be controlled under old conditions.

For two years the competitive battle waged—a 5 cent loaf of water, salt, yeast, and flour, matched against a Quality loaf rich in milk solids, high grade shortenings, and produced under a control in baking which brought every loaf alike in volume and color of crust.

The end of the struggle we had heard about from the loser himself, and his figures were verified by grocers and other bakers. The man who went in for quality, and sold at a fair price the best loaf he could build, gained in sales until he merchandised five loaves to one of his competitor. Both had the same access to the grocery field. Grocers at first favored the 5-cent loaf, but they soon found that their customers asked for the Quality loaf BY NAME.

That instance, to our mind, pointed the way to the Future. It told the story of the ACCEPTANCE on which alone any baker can grow. This baker added his contribution to the symposium as to whether there were new factors to be considered in baking, and whether the industry had arrived at the best loaf of bread that can be produced.

"We have just started in quality baking," he insisted. "We will yet go so far that our present loaf will shame us in another half decade." He told how he believed the advance would come about. In his prophecy he was in exact accord with the expressed wishes of Dr. E. V. McCollum of Johns Hopkins, and Dr. Eddy of Columbia University.

These roiling ideas, seeking expression in the form of baked bread from Quality plants, make us feel that the present Conference of Bakery Production Engineers is, indeed, epoch making in its possibilities. Can any baker afford to ignore its meaning?

Philanthropic Capital

How People's Legislative Service Seeks to Harvest It by Using a Cry of "Bread Trust" For a Scare

SPONTANEOUSLY from all parts of America the editors of the country's newspapers arose in defense of the baking industry when it was attacked by Senator La Follette's "People's Legislative Service" last month.

The service is in charge of Basil Manly, former member of the National War Labor Board, and former employee of the Industrial Relations Committee, of which Frank P. Walsh was chairman. Mr. Manly had much to do with staging sessions of the Industrial Relations Committee at which John D. Rockefeller, Jr., and Mother Jones, champion of labor unions, met face to face so that they had to greet each other and shake hands.

He became accustomed to think of industry in the terms of industry's ledgers, and to look in ledgers for legerdemain that could be attacked as trust-concealing. But in the baking industry a factor had entered recently that Mr. Manly had not taken into account. It was a dominating factor. It was Science—the Science of Bacteriology as Louis Pasteur had taught it, and the Science of Nutrition as Dr. R. V. McCollum of Johns Hopkins had taught it.

Men who applied the principles of Sanitation to the bake shop and then established conditions under which yeast could work at 100 per cent efficiency, could produce a loaf that for SHEER ACCEPTANCE would command the trade of all who once gained a chance to compare it either with home-made bread or craft-baked shop bread.

The way out, of course, is for more and more bakers to make better and better bread. Every city's baking story

is that the people have not cared for the cheapest loaf nearly so much as for the best loaf.

Editors see this point now, as they did not in former years. They no longer expect Royal Cord tires at the price of nondescript tires, nor the most nutritious milk loaf at the price of a yeast-and-water loaf.

Study here what the editors had to say about the La Follette-Manly charges, and you will see how slowly the story of the baking industry's revolutionary methods is becoming understood. There is one more factor to the story—the charges of Senator La Follette, while presumably directed to Congress, were in fact used as the basis of a gigantic attempt of the People's Legislative Service to raise money from philanthropic sources. Many people in Chicago, even, reported that they had received copies, free, of the expensive brochure in which these charges were drawn up and exploited. With the expensive pamphlet was a statement soliciting contributions. The effort to "harvest philanthropic capital" is an ancient one in American life; such harvesters have worked hard in many fields. Bread, it seems, was selected as a likely source of the hysteria that makes scared persons reach for their pocket books.

But on calmer second thought editors and housewives as well refused to be scared by the bugaboo of a "Bread Trust." They knew that any woman could buy the makings of a loaf of bread at the corner grocery, and that these ingredients were among the cheapest and most widely distributed factors of the daily diet. And they knew that while

some companies had grown large, through an enormous volume of sales, neighborhood bakeries still held their own on almost every corner, making a loaf to which Basil Manly pointed with the Pride of Ignorance—since customers often walked past this loaf to its more expensive competitor that was of higher quality, and of more appetite appeal. Here are some editorial views, printed as samples:

Conscious of Its Bread

Adoption by the senate of the La Follette resolution directing the federal trade commission to conduct an investigation into the milling and baking industries served to make the nation really conscious that it eats bread. **Whether or not bread is costing the consumer more than it should, the fact remains that bread is the cheapest of all the staple foods consumed.** Penny for penny, there is no food for which so much of absolute nutritive value can be purchased as wheat bread. It formerly was cheaper than it is to-day, but for that matter so was everything else. Yet, notwithstanding its rise in cost, bread remains the cheapest thing we eat. Moreover there is an aspect of American bread making that has not its counterpart anywhere in the world. Sanitary science has become essential. The modern bakery is a roomy, well lighted, well ventilated establishment, constructed with a view to being kept clean and equipped with machinery for all steps in the process of bread making. Human hands touch only the machinery, not the materials or the finished product. The bread goes out wrapped in a dust-proof envelope, and is distributed in a well nigh dust-proof motor truck to retail shops where it is kept in dust-proof cases. The little cellar bakery of an earlier day has just about disappeared, and is well rid of, for it was in most cases

a none too clean place in which to prepare food.

—The Fort Wayne (Ind.) Journal-Gazette.

Hopes That Died

Now Senator La Follette charges that a gigantic "bread trust" is robbing the people at the rate of \$1,000,000 a day. Of course the Senate started an investigation. If they had not they would have given Mr. La Follette a chance to "holler his head off" about the stifling of an investigation calculated to bring down the high cost of living. Maybe that would have brought his name before the country as a possible presidential candidate—more ridiculous things have happened in politics.

—Tulare (Cal.) Advance.

Home Baking Competition

The baking industry is only one of a legion in which the natural inflation of war prices has not yet been succeeded by a comparable reduction. Even if bread prices are shown to be too high it is still a fact that few people are compelled to pay them. Every housewife in the land has the means within her power to buy the ingredients and manufacture her own bread, if she finds that a saving is to be made.

—The Decatur (Ill.) Herald.

In Olden Days

"It was not like that in the olden days," said Lorenzo, "for they never called on Congress to have the bread trust investigated to prevent a gouge in the price of bread. Pioneer women baked when they were 1,000 miles from a bakery. They were versatile women and could do a little of everything. Now the bakery does the work and they are going to have it investigated."

La Follette is going to lead the charge against the bread men. Well, now that's about the silliest move I ever heard of. He seems to be acting on the theory that

there is no other recourse than an investigation. Every woman has a recourse—in her kitchen bread pan.

—The Galesburg (Ill.) Register.

McCann's View

If New York is an index to what is going on in the rest of the country there is no overcharge for bread, and the political agitators who would do so much to save the country from ruin by shouting at the bread barons, could render no greater disservice to the public than by succeeding in their effort to bring back the 5-cent loaf.

The English loaf known as "water bread" can still be sold at 5 cents at a fair profit. But in New York the "bread trust," to its credit, no longer makes such a loaf. New York's bread contains an enormous quantity of milk solids and shortening that used to be represented chiefly by water. Milk solids, adding greatly to the food value of the bread, cost money. In order to get bread back into the 5-cent class the milk solids would have to be abandoned. The bread would have to be degraded, labor would have to work for a very much smaller wage, and the public would have to be satisfied with a return to inferiority.

—Alfred W. McCann,
famous pure-food crusader, in a letter to
the N. Y. Sun.

Mother at Better Work

The bread "that mother used to bake" has been the toast of many succeeding generations. But mother is not giving her attention to bread making to-day. She has entrusted that task to the bakery, which is supplying bread baked in modern machines at a reasonable figure. The growth of the baking industry is a growth of which all citizens may well be proud. It exemplifies the statement of Herbert Hoover: "Every effort to put an industry on a better plane—to improve its technology, to improve its busi-

ness practices—deserves public support and I gladly commend it."

—The Iowa City Press-Citizen.

Plenty of Audits

The bakers of Indiana have had their books audited by State and Federal Agents. Reports are made upon our profits to the state's attorney general and agents of the Mayor's fair price commission—and this year in and year out. So we know this La Follette-Manly assault will run its course and die as have its thousand and one predecessors.

—A. W. Wilkinson,
in a letter to the Rushville (Ind.) Republican.

Fed Up on Investigations

It is true that it is possible to produce a cheaper loaf of bread than the highest-priced bread on the market. But it is equally true that the housewife would reject such bread if offered to her. She demands the best that can be made and is receiving it here in Newburg at a very narrow margin of profit. It is not right that the people should be fed up on these assertions of brain-storm investigators, and I for one would be glad to produce my cost sheet for flour, ingredients, overhead, and delivery, to prove how we bakers stand in this respect.

—H. C. Williams,
in a letter to the Newburg (N. Y.) News.

If an Investigation?

An investigation might show that some bakers in the country have been making pretty good money while others have made less than they really need. This showing may be expected in all lines where many are engaged. To us the baker looks like an honest and hard working man who is keeping himself together and looks as if he is good for a few years more. The folks at home say he is selling bread for less money than they can make it, so we don't want to go out of the way to seek other troubles with which to decorate our harrassed lives.—The Decatur (Ill.) Review.

The Bakers' Defense

In repelling the charges of a bread trust the bakers' spokesman claims that labor costs have increased from \$20 to \$50 a week; that rents have advanced; that fuel cost has increased; that delivery costs are more; and that the law compelling the wrapping of bread adds to the cost. This is a reasonable defense. It is certainly impossible to charge the bakers with profiteering merely because the decrease in the price of bread is not in keeping with the decrease in the price of wheat. An investigation might result in the complete exoneration of the baking industry.

—The N. Y. Evening World.

Flivveritis as a Curse

Baking days and home-made bread in the home ought to be restored so that consumers can get more benefit than the bakers allow them from the lower price of wheat. But how in the name of modern life and its beatitudes or profanity, as one may please, are we to get home-made bread when the flivver is waiting at the door at sunrise, already cranked up for an all-day joy ride?

—The Easton (Pa.) Press.

Fails to Terrify

That dreadful "bread trust" which Basil Manly conjures up, somehow fails to terrify. His long report is unconvincing and superficial. What Manly and his colleagues fail to take into consideration is that there is bread and bread—poor, thin bread made with water, and rich, highly-nourishing bread made with milk and butter; bread baked in dark, musty, smelly basements with antiquated machinery, and bread baked in bright, wholesome, sunny rooms by improved methods; bread scientifically controlled and uniform day after day, and bread thrown together by rule of thumb and varying from fair quality today to poor quality tomorrow.

Manly concerns himself with the price of wheat and flour. He pays no attention to the other ingredients or to the tremendous investment which bakers have made in improved machinery and well-ventilated, sunshiny rooms and chemical research laboratories. He forgets the elaborate distribution machinery which must be maintained by producers of "the staff of life" and he takes no account of increased wages among bakery employees.

The public remembers the "bakers' bread" of 20 years ago—doughy, spongy, rubbery, sour stuff known to many households as "punk." And the public is very grateful that the bakers have left that phase of their industry in the dim and hazy distance.

—The Fort Worth (Texas) News.

Old Fashioned

"Advertise as you eat," suggests John Burns, father of the toast revival idea, and to illustrate what he means, he suggests that millers entirely abandon advertising flour as it is eaten only as baked bread.

Armour's "Cloverbloom Creamery Butter" is now advertised that way—not as butter but as a spread for bread. "It may be old fashioned," runs an ad., "to say, Give the children bread, butter, and sugar when they come home from school, but it is a fashion that time has not changed. Bread and butter are two foods that nourish, build strength, furnish energy and above all **promote growth** like no other foods can. The added sugar satisfies the craving for candy and sweets—and provides additional nourishment."

This is only one of the foods that are now being advertised as they are eaten and with each new advance in this field bread comes in for honorable mention as a carrier.

To Increase the Use of Wheat

*Plan of American Institute of Baking to Carry on in Field Opened
by the Wheat Council*

By DR. L. A. RUMSEY

THE per capita consumption of wheat foods, especially bread, in the United States, is far below the pre-war level. It continues to decrease. Before the beginning of the World War, the per capita consumption was 5.06 bushels of wheat per year. For the past three years, the average has been 4.22 bushels. Thus a return merely to pre-war consumption would mean, in terms of flour used, about 20,000,000 barrels. However, pre-war standards do not mark the limit of this campaign; they merely show the vastness of the opportunity.

Bakers welcome the statements of accepted authorities on nutrition that we can well increase the wheat food basis of our American diet by a considerable percentage, with a definite improvement in public health and stamina.

The Wheat Council of the United States has accomplished a great work. The direct personal interest of millions of people in wheat foods and bakers' products had been awakened. The three great constructive agencies of government, agriculture, and commerce are already at work carrying on the plans which will bring the production of wheat in this country to a proper balance with the requirements of commerce. At the same time, the greatest opportunity for constructive action lies in the field of increased wheat consumption. It is this program for teaching a nation to eat more wheat foods which the Wheat Council has turned over to the Baking industry.

The National Toast Campaign has brought to the bakers the assistance of Federated Women's Clubs, Home Econo-

mics Teachers, Parent-Teachers' Associations, and Housewives' Leagues everywhere, to teach the true value of bread in the diet. Through the Wheat Council, the campaign for increased wheat consumption has become a great public movement, enlisting the support of newspapers, magazines, civic and social organizations, allied food interests, Federal and State governments, farmers' organizations, schools, etc.

The American Institute of Baking, by enlarging its influence through the Wheat Council, has secured the actual cooperation of the greatest industries and organizations in the country. That position among the leading industries must be maintained.

A national interest in the problem has created a wonderful opportunity for immediate, concerted, and constructive action. To the progressive bakers of America belongs the responsibility for raising wheat foods to their rightful place as the basis of our American diet.

The problem is a logical one of national education to an increased use of bakers' products.

Campaign Organization

The organization of the campaign plans has proceeded to the point where a continual stream of newspaper copy, magazine articles, advertising suggestions, scientific information, speeches, literature, and other material is going out to individuals or groups for publicity all over the country. Toast Campaigns in seventeen states have opened the way to further acceptance of educational material for homes and schools. City, state,

and regional committees are continuing their work to reach the public with the facts for more and better bread. These are off-setting the publicity of unjust attacks on the baking industry.

The Campaign

What the American Institute of Baking is **actually doing** to carry forward the campaign is outlined in the following notes:

Over three thousand columns of newspaper space have been devoted to favorable news items, editorials, recipes, and special copy on the National Toast Campaign in the months of December to March. Every article of unfavorable comment has been met with facts, figures, and statements which bring favorable reactions from newspaper editors.

Practically every issue of food and trade journal magazines carry some story or editorial of value to the Baking Industry. These magazines of especial interest to women and domestic science students are accepting articles by national authorities on wheat foods. The official publications of many national associations are advising their members to cooperate with the Baking Industry. Talks on toast, bread, baking, and consumption of wheat have been broadcasted from coast to coast.

A program consisting of a series of talks for the use of radio on a national scale has been worked out. These will be distributed to selected speakers, for all the important stations, in cooperation with the Joint Committee for Business Development of the electrical industry.

Women's Clubs

The General Federation of Women's Clubs has appealed to all its members of organizations to cooperate in the campaign.

In several states, wheat and bread programs have been made the special feature

of club meetings. Well informed members of the baking industry have been invited to address meetings of women on the value of the bakery to the home. Parent-Teachers' Associations have arranged demonstrations with lectures on the place of bread in the diet, using supplies furnished by the bakers, electrical companies, butter manufacturers, preservers, and other cooperating groups.

Schools

The active cooperation of educators is being secured for interesting the children directly in wheat foods and teaching them the nutritive value of bread in its proper relation to all other staple foods. Special class work, demonstrations in domestic science classes, and special instruction in baking methods have been given in several larger cities. Classes of public school children have been conducted through baking plants and contest prizes offered for essays or art work to follow. Contacts have likewise been established with university and college home economic departments, with home demonstration agents, and with state extension workers.

Educational Posters

An attractive colored poster, urging the increased consumption of wheat foods as part of a well balanced diet, is being published by the Department of Agriculture, with their indorsement. This will be supplied in quantity for posting in schools, post offices, public buildings and railroad stations, for distribution by millers and bakers to their customers. This poster will later be reproduced in the forms of stamps for use on letters, etc.

National Advertising

Bread is being made the standard accompaniment of all pictorial food advertising. The largest advertisers of flour, butter, meats, oleomargarine, cheese,

milk, jams, jellies, preserves, honey, peanut butter, and other food products, are designing their new copy to use bakers' bread, or toast, as the basic carrier or background for their taste appeal. In this the baker reciprocates by adding the appeal of a balanced food diet to his bread advertising.

Toast Campaign

The National Toast Campaign, after a year of experience in sixteen different states, has proven to be a remarkable success. The movement has been the greatest single factor in creating a universal public acceptance of more and better bread. Approximately a million new homes are using toasted bakery products every day. Twenty-nine national industries are behind it with their indorsement and full support. New campaigns are developing every week.

Educational Pamphlets

The educational booklets prepared for the Wheat Council of the United States are being rewritten for national distribution. They will include the—Story of Wheat and Bread. Scientific Studies for Dieticians, home economics teachers, home demonstration agents, etc. Illustrated educational literature on milling and baking processes. Recipes. The Relation of Wheat to Young America. Leaflets for use of school children and women's clubs are also contemplated to enable the bakers to secure the support of the schools and women's clubs. Others will be prepared to meet the needs of the increased consumption program.

Speeches and Speakers

The Institute has supplied copy for many talks and speeches in the past. Speakers have also been available for many public gatherings. This service will be continued.

Universal endorsement and support of the campaign has been in recognition of the fact that the great object of the movement has been to broaden the farmers' home market, stabilize the wheat industry, and place wheat foods in their rightful place for a healthful, normal, balanced diet.

Such a program directly benefits the baker, for it carries **two** personal messages straight to the housewife and her family.

(a) They are made to understand that the bakery is a valuable friendly industry operating a community enterprise in their service; a business which prospers only in direct co-operation with the household kitchen. To furnish the family with the highest nutritive quality of basic food, with the greatest economy of any food prepared for domestic use, is an undertaking worthy of the housewife's personal support.

(b) The baking industry is directly concerned in the family's welfare. The desire of its members is to teach the nutritive value of its wheat products; to make possible a greater selection and in greater variety of other desirable supplementary foods; to effect a greater economy in food cost, all in the interests of better national health.

A careful study of several hundred reports sent to the Wheat Council by representative bakers from thirty-six states shows a complete unanimity of opinion as to the only way to increase bread consumption. That is by a universal educational program, national in scope, without selfish propaganda, backed by the highest quality of food which can be produced.

Here is a public service with personal profit. The American Institute of Baking, the Big Brother of the Baking Industry, is already carrying on a large share of these activities.

The individual support of the progressive baker in his own community is necessary to complete the job.

Meals Like These

A BAKER who formerly worked for a wholesale grocer explained during a visit to the American Institute of Baking that he once had to make telephone calls daily to a long list of regular customers. He was to find out their wants for the day.

On the lists furnished to him the names of just two foods were printed. All the rest he had to write in. The two food names printed were **bread** and **milk**. These were ordered so consistently that they were taken as staples. All others had to be written in, as the variation was so great a printed list would be of little use.

Just what that grocer's food list meant in the terms of an ideal daily diet for a well-regulated home is shown in a report of the Boston Dietetic Bureau. This is one of the authoritative institutions of the country on foods and their relationship to health. The National Dairy Council reprints a menu card for seven days, as arranged by this bureau.

In glancing over it the words "bread, butter and milk" occur in connection with every single meal.

Among breakfasts, for instance, are these suggestions: Monday, bread, butter and milk, with rolled oats and an orange; Tuesday, toast and butter with poached eggs and milk; Wednesday, bread and butter with stewed prunes, farina and milk; Thursday, toast and butter, with rice and raisins served with milk; Friday, toast and butter, with baked apple, corn-meal mush and cocoa; Saturday, toast and butter, with crisp bacon and milk; Sunday, toast and butter with apple sauce, oatmeal, and milk.

The same rule held through all other meals. Bread and butter was not missing from a single meal, but bread pudding as a desert added to the usual recommendation for a Wednesday luncheon, and

peanut butter was recommended as a spread for bread for one meal.

Ways to Serve Toast

When H. D. Lennon, of the Waters-Genter Co., of Minneapolis, decided that toast was a good thing for the American menu—and would be vastly popular if well made—he did not adopt "half-way" measures. He enlisted for the National Toast Campaign in a whole-hearted manner. He developed a toaster that would provide for wholesale servings of toast—in restaurants, hotels, and cafeterias. He geared the toaster to work as fast as was consistent with making excellent toast.

In addition to providing a means to make the serving of toast easy in public eating places, he published a booklet: "Fifty-three Ways of Serving Toast."

It develops, as good restaurant dishes, asparagus on toast, baked ham on toast, baked tomato on toast, banana toast, chicken on toast, cream tomato on toast, creamed celery on toast, creamed okra on toast, creamed spinach on toast, date toast, egg salad on toast, French apple toast, fruit toast, green lima beans on toast, onions on toast, prune toast, sliced chicken with mayonnaise on toast, and snow flake toast.

The three deck sandwich—something every baker should watch who serves a restaurant trade—is featured in all its glory of baked ham fillings, egg fillings, swiss cheese, duck, and peanut butter fillings. This sandwich is sweeping the middle-western cities, and making chains of coffee shops very popular.

Bakers who wish to keep better acquainted with the art of sandwich making could well afford to send for this booklet. The address of its publishers, the Waters-Genter Co., is 20 North Second Street, Minneapolis, Minn.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

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We Work Together

To win through quality production and the utilization of scientific research a welcome for two loaves of wheaten bread for every one that now finds favor.

Her Majesty's Men

AS this issue reaches the desk of its readers, the American Institute of Baking will be greeting one of the most important bodies of men that have ever been gathered together in this or any other industry. We refer to the conference of Bakery Production Managers and the probable organization of such men in a branch of American Bakers Association.

There are many important luxuries on the market which bear with considerable pride the inscription that they have been made By Special Appointment of Royalty. Certain high-grade cigarettes, for instance, bear on the package the words "By Special Appointment to the King." The manufacturers seem to take the attitude that the quality of the product is guaranteed by such appointment. The men meeting in Chicago have a still greater appointment. They have been selected by a process of elimination until they may indeed rightfully say that they are producers of the most important food—

our daily bread—by Appointment of Her Majesty, the American Housewife. As they are meeting in Chicago they will take full cognizance of the responsibility placed upon them by such appointment. They will spend three days in a discussion of the problems incident to producing the highest quality of bread, great in nutritive value. May the whole industry not join with them in the full realization that nothing but the best is fit for the consumption of that Queen, The American Woman?

RAYMOND K. STEITZINGER,

President.

As to an Advantage

IN pushing up orange sales from 5,000 carloads a year to 28,000 carloads, G. Harold Powell, master merchandiser of our times, had an advantage that neither wheat growers, millers, bakers, nor grocers can duplicate. He controlled in his one office the selling policies for the whole orange crop. He could take toll from sales for the funds he needed to advertise, to perform research work in the perfecting of packing and shipping devices. He was never dependent for funds on voluntary subscriptions from orange growers after they had once felt the feel of money in their hands, returned from the sale of their product. While farm papers reviled wholesalers, jobbers, and retailers as "robbers," Powell became really acquainted with them and cooperated with them instead of reviling them; the result was the development of team work in merchandising that startled and forced from the market practically all foreign growers.

The best that wheat growers, millers, bakers and grocers could do to match this system was to attempt to create a *community intelligence* comparable to the intelligence of the one directing head of

orange merchandising. Thus was created the Wheat Council of the United States, in which, theoretically, bakers, grocers, millers, farmers, machinery builders, railroads, and others who participate in the handling of wheat were to cooperate to create new ways to merchandise wheat, and new ways to gain favor for baked products—the form in which wheat finally goes to consumers.

But men who will look up from daily tasks, who will get a National vision of their own field, even, are rare. The Wheat Council is gone. The American Institute takes over its tasks. Much is to be done, but until the vision comes, effort can never accomplish what a few men saw was to be accomplished, and bravely fought to accomplish until the morale behind them faded out.

Indifference

THE will to grow is often said to be the strongest force in human nature. When people see an executive cutting down the growth of those around him, they naturally turn against that executive as a danger to the aspirations of all. So he harvests no good will. General Grant had once an opportunity to "lift" a fine plan from a subordinate officer. An engineering officer, having no troops to command, brought him a plan of battle all worked out. General Grant listened, and saw that it was sound. Instead of "lifting" it, and going ahead himself, he made this engineering officer a line commander and then seconded and backed him in carrying out his plan. It won. And so General Smith swam forward into fame as an accredited member of the family of successful northern field generals. And all pushed forward together for victory.

The other side of the story is the indifference that comes when the subordinate

is always made to feel that he does not count. His attitude becomes like that of a plant that has had no water and little nourishment.

"Do you know," says *Baker's Helper*, "that in a recent investigation involving a large number of bakery customers it was found that indifferences of sales people accounted for almost half of the lost trade?"

"Do you know," suggested Richard Wahl in a talk to our School of Baking students, "that every time the man on top takes authority away from his subordinates, and does their work over their heads, he makes them indifferent and listless towards their tasks. Their loyalty must be won—and won by fair treatment. It cannot be bought with cash, or commanded, or coerced."

Elsewhere we print a fuller story of Richard Wahl's address. We commend it to all our readers—especially chief executives.

New Times—New Ways

A CLERGYMAN, famous for his Chicago sermons, made this statement from the pulpit: "I desire to congratulate that lady who dresses so that she may hear my morning sermon. A night gown is not a fit garment in which to listen to the word of the Lord. I hope all of my congregation will feel as this lady does, and dress for my services, rather than listening in night gowns and pajamas."

Who in all the world could have correctly interpreted this remark until the year 1923? The next sentence of this famous clergyman, Dr. Shannon, of the Central Christian Church, whose services are held at the Auditorium, Chicago, ran: "And I wish to thank that member of my invisible radio congregation who suggested that Easter Sunday be dollar Sunday for those that hear us but are never seen."

With Delegated Authority

How the Subordinates in a Bakery Must be Respected, Each in His Place, To Build Office Morale

By RICHARD WAHL*

Production Manager, Regan Bros., Minneapolis, Minn.

WE HAVE in the bakery today, first the manager or the proprietor. He is the man who guides and directs all operations. If he tries to guide and direct his sales organization by personal contact, forgetting that he has a Sales Manager, he will meet failure in sales organization. If he tries to direct and operate in the production end of his business, overlooking the fact that he has a plant foreman or superintendent, he will have failure in his Production Department.

To accomplish more than he personally can himself, the proprietor places a man in responsibility over his sales organization, and we term him the Sales Manager. Then he places a man in charge of his production work, and he is termed the Production Manager. There are two men he has surrounded himself with who are capable of doing as much in each one of those departments as he could do himself. And what has he accomplished? He has accomplished an organization that can work twice as fast and as hard as he can, and accomplish twice as much.

The proprietor then places a man in charge of his bookkeeping system, and we term him usually the accountant. That is a complete organization in the bakery. We have responsible men directing the different departments. That is the nucleus of an organization. We find many sales organizations throughout the country—some are strong, some are weak. Some bakery sales organizations are capable of taking an inferior product

and going out and increasing their business constantly, although they have in their competitive field a high quality loaf of bread. Why are they able to do that? Because the sales manager has placed men under him who are capable, in turn, of doing as much work in their specific line as he could do himself if he were doing the work. If he has a sales organization of ten men and he directs those ten men properly, he can accomplish ten times as much by utilizing the ability of those ten men as if he tried to do the work himself.

You boys here are studying and are interested in the production end in turning out a good loaf of bread, and keeping the cost down. If you are not supported by a good sales organization, you are not going to obtain success. Therefore, it is necessary for you to be vitally interested in the sales end of the bakery, as the selling of bread is important to your success.

Now the production work can be organized according to the size of the plant. We don't want any more men in our Production Department than is necessary to produce the given amount of bread. At certain times of the year production falls off and it is necessary to reduce your crew to operate efficiently. In reducing your crew you should take into consideration the men you are letting out, and whether you can afford to lose them.

In our own organization we have a production manager. He directs the work of the Production Department. Under our production manager we have what we term a superintendent. He is not a work-

*In an address to School of Baking students at the American Institute of Baking.

ing man. We do not want him to work. He has plenty to do to keep every man in his organization working without going to work himself. Under our superintendent we have three shifts and three foremen, one foreman to each shift. The duties of the superintendent are all he can attend to to keep the foremen working their men properly and working their men with as small a number as is absolutely necessary to turn out the production. He advises and consults with his foremen.

Forgetting the Subordinate

Should he at any time forget that he has put his foreman in charge of each shift, and go to a man working under that foreman and give him instructions on how to carry on his work, he is taking away the authority from the foreman and you might just as well eliminate the foreman. That is the hardest thing in organization work—for the man higher up to respect and appreciate what authority means. You have authority in your Production Manager. You have authority in your Superintendent under the Production Manager; you have authority in your Shift Foreman, but don't take advantage of your authority to break down the morale of your organization. That is the big and important factor in organization work.

I have gone into plants where they have charts outlining a beautiful organization, where they have a Production Manager, a Superintendent, Shift Foreman and all the men necessary to operate the plant properly. In looking over that plant you can notice they have no organization, for this reason, that everybody is taking authority upon himself, disregards the authority of others and has the plant in a demoralized condition, with the result that it takes more men, the men lack interest in their work, and your cost of pro-

duction is high, with quality not uniform.

The Shift Foreman has his duties to perform. He has charge of the mixing room and crew at the time he is in charge. He has charge of the make-up department, including his divider men, his molders, his oven men and his bread wrappers, pan greasers, and all the men necessary to operate the department efficiently. The foreman is the man who can produce and obtain more from the men in his crew or shift than any other man can obtain from them. The foreman in charge of our shifts can obtain more from the men in his shift than I can obtain from his men, for the reason that they are each and every one of them trained to respect him and abide by his decision. If we find a man who is constantly anxious to show his authority and disregard the authority of others, whether he is a good man and valuable to us or not, we release him, as we find if we keep him he is more costly to us than by eliminating him and training another man for his position.

The Shift Foreman should be permitted to discharge any man who is not functioning properly. He knows how much each man should produce. If a man is not producing and you do not give him the authority to discharge him, the men lose respect for your Shift Foreman and will not work for him.

In our organization in Minneapolis, I, as Production Manager, check up on all materials, such as flour, sugar, milk and shortening, trough grease, and pan grease. I work out the formulas. After I have a formula worked out and am satisfied that that formula will produce results, I turn it over to my superintendent. That is the last I worry about it. He then in turn must train each one of his foremen to handle that dough according to specifications. In turn each one of the foremen train their men from the time the

raw materials come together to the time the loaf of bread is baked, how to handle that formula. What is the result?

Each Man in His Place

Every man has an important part in producing that loaf of bread. If each man is interested in his work, we are going to get a more uniform loaf of bread and a higher quality loaf of bread after each man is trained. I judge the finished loaf of bread, and from the finished loaf of bread I judge whether my organization is functioning properly. If I find there is a mistake made on the night crew, I don't go to the man who is making that mistake. Probably it is the mixer; I might know it is mixer. I might feel that I ought to tell the mixer that he isn't handling the mix right, or the formula not worked out the way I want it worked out. I tell the Superintendent. The Superintendent tells his Foreman, and the Foreman, if he doesn't eliminate that trouble, is not heavy enough to have a Foreman's job. It is then necessary to plan on relieving him and place another man in his position who can produce results.

Under those conditions we find that we all have enough time to handle our work properly. It gives me enough time to keep in constant touch with all the raw materials, and to check up on my equipment. As in each large bakery, we have an Engineering Department, and if the Engineering Department is not functioning properly your bake shop is not going to function properly, as breakdowns in a bake shop are very serious.

I have heard bakers say that they do not want to have too many plant managers around their bakery, as it means higher costs. But if you are experienced and have followed the methods and operations in a large institution, you will find that it is necessary to have a supervisor

over a certain number of men to produce the maximum results at the least cost. In many bakeries today, if they would organize and provide the proper supervision, they could reduce their costs from 20 to 40 per cent in their own organization.

It is necessary for the Production Department Manager to take all of the responsibility. My manager tells me that he doesn't care whether I am in the bakery for a week or a month at a time, but that if we have burned bread or if something goes wrong while I am gone, he doesn't hold the man responsible for burning that bread. He holds me directly responsible for not obtaining the right results, and if things don't go right when I am not there, they are going to be straightened out so they will be all right afterwards. If every man who is responsible for certain work will take that same attitude, he will get the loyalty of his workers, and with the loyalty of your workers and their interest in their work, you can almost produce with 100 per cent effectiveness.

From Palestine

Will you please send to me the scientific bulletins of the American Institute of Baking. I wish especially the bulletin by Dr. L. A. Rumsey on "The Diastatic Enzymes of Wheat Flour." The pay and postage I shall send to you immediately after your answer.

—Dr. F. Mentschikowsky,

Manager of the Chemical Laboratory, Zionist Executive Agricultural Experiment Station, Tel-Aviv, Palestine.

The day I spent at the American Institute convinced me without other argument that no baker serves himself to the best of his ability who remains outside of the National Association.

—C. P. Ehlers, Secretary,
Indiana State Bakers Association.

The Newer View of Bread

How It Leads To Quality and Increase in Consumption Per Capita

By R. L. CORBY

Director, The Fleischmann Research Laboratories

STUDIES in the composition of wheat flour and the effect of mixtures of wheat flour and water, forming dough, date back probably to from 1728 to 1747 when Beccari published in the Proceedings of the Bologna Academy an account of his experiments with wheat flour. He described the separation of the flour into two parts, one of which, he said, "was similar to those things that are extracted from vegetable substances, and the other was such that it did not seem possible to extract it except from animal matter."

Passing on through the years, many investigators gave up the best part of their lives in the hope of uncovering the hidden possibilities wrapped up within the wheat berry; though little was known until Thomas B. Osborne, Ph. D., completed his work on the wheat proteins. Our advance in the newer knowledge of wheat flour can be said to date from that time.

First, we learned about gluten, its chemical composition, its form, how to recognize it, the effect of quality as compared to quantity, and the principles surrounding the methods for increasing its quality in a dough.

Second, attention was given to the mineral matter or ash, the quantity in the various types of flour, the importance of regulating it to a definite ratio to the gluten as it affected general quality of the bread, and the fermenting period of the flour when made into bread dough.

Flour forms from 56 to 58 per cent of the weight of bread dough, and from 61 to 63 per cent of the total weight of the finished baked loaf. It is, therefore, one of the most important of the dough batch

ingredients. Many bakers, bakery laboratories, flour chemists and baking chemists have noted the importance of gluten quality and the ash content of the different types of flours as they have affected its fermenting period and dough characteristics. Recognition of these values has heretofore been of untold importance in the older methods employed in the manufacture of bread.

The propelling force of individual commercial achievement has led us away from the greater possibilities; therefore, we have met defeat in our efforts to increase the consumption of bread through what would seem to be a lack of an established confidence between the combined interests as they affect the consuming public.

The specification for quality, or flour grades, expressed by milling practice terms, has been decidedly confusing, leaving in the mind of the buyer, what might be termed, a grave query. On the other hand, a specification for wheat flour for the manufacture of bread based on its composition (once held to be all-important) has led us from crop to crop into the ever-increasing demand for a high protein, low ash type of flour, with special emphasis on its moisture.

Is it a thinkable proposition that any miller of wheat flour would fraudulently, and in a predetermined way, increase the percentage of water in flour for the purpose of selling less wheat and more water, without instantly realizing that he would be automatically annihilating his own best interests? The use of water in the conditioning of wheat for milling is as

essential as is the bolting cloth. It is our opinion that rare judgment is being exercised by the millers in this conditioning treatment, without which the art of milling could not have advanced to its present high standard.

There has been an increasing demand for that type of flour which would carry a high protein (12 per cent) and a very low ash, with other specifications. We find that in following this practice wheat buyers have been driven to pay enormous premiums for that class of wheat from which this abnormally high protein and low ash type of flour can be produced.

From the total U. S. wheat crop of 800 million bushels, there has only been available on this crop 60 million bushels of wheat suitable for the production of this 12 per cent protein, low ash flour. This character of wheat represents but approximately seven per cent of the total available supply, and also represents less than thirty per cent of the total of the bakers' demands.

The Older Specifications

The following of such flour specifications has brought about many very apparent evils. First, it has inflated the bushel price of that particular type of wheat which has been reflected through to the cost of the flour. Second, it has upset the balancing of the food nutrients of wheat flour, because in the majority of instances the protein of the average flour has been slightly reduced, and, most important of all, there has been a great reduction in the percentage of the wheat mineral salts which we have learned are so important as human food nutrients. Third, it has restricted the general blending of more of the classes of bread wheats, thereby reducing, on the whole, general flour quality with increased cost.

It can be seen, therefore, that following the continued use of these wheat flour

specifications is bringing about a great economic loss. The type of flour just referred to is not to be considered as preferable in the manufacture of better bread. It would seem, however, that we have been trying to meet an ill-directed line of development. The present practice has resulted in an increased cost in the flour, not to a few bakers, but to all bakers, and, most disastrous of all, it has brought about a decrease in many of the valuable wheat nutrients.

While a fairly presentable bread can be made from any average type of grade of flour of today, we feel that we will not derive the utmost from our efforts unless we can decide that there is little reason for our continuing in present-day practice.

Increase Through Improvement

From the outset we have understood that the principal object has been to increase the consumption of bread, and certainly if this is to be accomplished it must be by the production of better, more nutritious, and more tasty bread. During late years, therefore, our thoughts have been directed to this one point, viz: the formulating of a policy and a procedure which could be followed by both millers and bakers to effect as large a consumption of bread as possible—bread that is more tasty with increased nutritive value, but at no increased cost to the consuming public.

We have found, after actual and repeated demonstrations, that a flour which is obtained from milling to a percentage extraction from the average of the bread wheats—totally disregarding its protein and ash content—will represent from each 100 pounds of wheat 70 pounds of flour, which will produce a bread superior in its essential quality points, of taste, color and nutrition. The volume is not only equal to but greater than that obtained from a majority of the types of flour containing

lower quantities of mineral matter. The texture and keeping qualities exhibit a marked improvement.

Our work in checking this character of flour against other types has been so convincing we feel it highly important that miller and baker should take immediate advantage of our findings before the new crop year. You appreciate, of course, that the same fine system of milling must be employed.

We therefore have no hesitancy in assuring the millers and the bakers that if this type of flour is milled from the average of all classes of bread wheats, there can be little question left as to the lifting of the great burden which is upon us in the production of better bread.

Our understanding is that with every new crop the miller is confronted with a new problem. The milling process has to be adjusted to fit the new classes of wheat, as well as the different weights wheats (when they exist), and that one type of wheat will mill to a higher extraction than another. We recognize, therefore, that the same percentage extraction cannot be adhered to from year to year. Nevertheless, it would seem that our central thought in connection with this idea can be carried out, and we hope that it will meet with your favor because it would appear to be economically sound.

High Protein Wheat

It may be expected, since there has been a continued call for an extremely high protein flour, that many readers will think that the protein content of the higher extraction flour, just referred to, will run still higher. Such would not be the case on this crop, but if we could have taken advantage of these points the average would certainly have been slightly higher. It is one thing to produce a high protein type of flour with low ash from one class of wheat, but, on the other hand,

it is quite another thing to be able to produce a 12 per cent protein flour from all of the classes of our bread wheats. Such practice will not permit of the production of the highest types of bread. So it is purposely urged that no attempt be made to produce these special high protein, low ash flours, as it will only add to inflated costs without value received.

While it may be considered important that wheat flour should run as high as 12 per cent protein with an ash content as low as .40 per cent, it is, as a matter of fact, wholly unnecessary. It is known that for the production of bread which will meet what seems to be the present deficiencies in the human dietary that a 12 per cent protein flour is not required. It represents an economic loss and can hardly be based on the newer knowledge of nutrition.

From this crop we have had over 300 million bushels of wheat (representing over 100 million bushels more than present-day consumption by bakers), which when milled on the higher extraction basis of 70 per cent and more would yield flour with an average of 11 per cent protein; a quantity of protein which will meet the requirements for a protein intake through bread to balance it in the dietary. The present point is that it is a comparatively simple matter for the consuming public to build up its protein intake from the combined classes of foods now generally consumed, and also for the baker to build up the best classes of protein without necessarily trying to depend upon the wheat protein.

Wheat's Mineral Salts

It is a serious question, however, as to whether or not we are obtaining as great a quantity as we require of those most valuable mineral salts such as are found in wheat. In certain classes of Northwest wheat the 70 per cent flour will contain

approximately .6 (6/10ths per cent) ash. This, compared with the flour running at .4 (4/10ths per cent) ash, would appear to be so small a difference as to be negligible, so far as it affects nutrition. It must be observed, however, that such an increase in the mineral content of wheat flour will increase the consumption of wheat mineral salts by 50 per cent; and we have no doubt, if this class of flour is generally produced by the millers, that from time to time they will uncover the now hidden possibilities of still further increasing the mineral salt content of flour without changing any of its other valuable characteristics.

Bread is not a specialty food—it is consumed three times a day. Increasing the wheat mineral salt content, therefore, by 50 per cent and over becomes a very important factor.

Heretofore the high ash content of flour, and the high ash ratio to protein, have been very cautiously guarded against on account of the effect upon the fermenting period of bread doughs, and the effects brought about from the general behavior of the dough and finished bread—especially the keeping quality of the bread. But now that it has been found that a fermenting period or dough time is wholly unnecessary, this once dreaded characteristic in bread doughs has been completely erased, for it has been made possible for the bakers to use a wheat flour, in the production of bread, milled not to a protein and not to an ash, but milled to the highest extraction of the wheat possible, with the highest ash possible, without interfering in any way with the general fine quality of better bread and one that will keep fresh for a longer time.

It may be predicted, therefore, that further reference to flour for bakers in the terms of patents, straights, cut

straights and stuffed straights will come to a very early end: and may we urge that this be brought about by the combined forces of the milling industry dealing in brands and not in milling terms?

Following our continued studies in the production of better and more nutritious bread, at no increased cost to the baker, it has developed that one of the greatest sources of relief lies in the adoption for general use of that character of flour which will represent the greatest possible extraction from the wheat berry, leaving only the fibre and germ behind as joint products to the flour.

For our guidance in this matter, it has been found that slightly better than a 71 per cent extraction can be affected from the average class of all the bread wheats of this crop.

Bearing these thoughts in mind, we have:

First: The possibility of grinding into flour for bakers' use 100 million or more bushels of wheat.

Second: The elimination of wheat premium buying.

Third: Increasing the valuable nutrient salts of wheat flour by 50 per cent and more.

Fourth: The reduction in the cost per barrel of flour to the bakers.

Fifth: More nutritious bread.

Sixth: Standardized milling practice.

Seventh: Bread that will taste better.

Eighth: Bread that will remain fresh for a longer period of time.

I hear that applications for the baking course at your School of Baking are literally pouring in. Therefore I want to take the necessary precaution to assure myself a berth in the September course by registering now.

—Oscar J. Roth, Newport, Ky.

The Raysens of Corinth

*And How They Still Honor In Their Name, Currants, the
Famous Biblical City Whence They Came*

By DR. C. F. RUDMANN

Research Department, American Institute of Baking

BAKERS, like the rest of the world, look for glory in feats of arms, or skill in games, and let the common things around them repose unnoticed, as to their romantic meanings. Who would pick up a hand full of currants, as a possible pie filler, and think that in their name they honor the once glorious city of Corinth, Greece? Her great fortress, the Acrocorinthus, has gone the way of Aphrodite, her most famous goddess, into the limbo of forgotten things. But her contribution of the world's best pie filler—for those who like currant pie—remains to keep her name alive. In Danish and German they make a better business of pronouncing the word "currant" to show it really means Corinth, than in English.

Currants, and their larger sisters, the raisins, are playing a more and more important part in the baking industry, for mother has given over pie-baking at home as she has bread baking. Dr. C. F. Rudmann is working at the American Institute to determine the best ways to utilize raisins and currants in American bakestuffs. He has checked up, also, a little of the role of raisins and currants in past centuries. Many bakers are called upon to make speeches about their industry. Therefore they must know its story as well as its possibilities. For such the historic role of raisins and currants is here given.

One thing it shows us is that California occupies a unique position, both as to soil and climate, in that it can offer raisins to the American baking trade and to house-

wives. They are plentiful in very few other portions of the globe. Not all their richly romantic story has to do with Biblical times. A Sioux Indian chief, when ordered to a reservation, said he would go if the whites would give him raisins to plant, as these were the best food the white man had. When General Doniphan's Missouri troops swept the Mexicans out of the Rio Grande Valley, near El Paso, during the Mexican War, the feast they had on raisins became the principal item they wished to record about their expedition. They plead for America to take this country "for its fine raisins." The new merchandising methods which make it possible to merchandise 240,000 tons of them as easily as 40,000 tons were merchandised before the day of cooperative marketing, are methods all bakers could well afford to study. They are new—and revolutionize old-time merchandising spirit.

The term "raisins" generally means the dried fruit of certain varieties of the grape vine. This fruit is rich in sugar and should not be confused with "dried grapes." The latter means the dried fruit of any variety of grape vines, but refers ordinarily to the product used by wine makers.

The origin of the word "raisin" is a matter of dispute. The present word is probably evolved from other words of slightly different spelling. For example, in Shakespeare's Henry IV, Falstaff says: "If reasons were as plentiful as black-

berries, I would give no man a reason under compulsion." Then Cooper's dictionary of 1685 gives "reason" and "raisin" the same identical sound. Some think the name is derived from the German or Danish "rosine" or "rosen," meaning a red rose color, while others ascribe it to the fact that the fruit is cured by the "rays of the sun." The best evidence, however, points to the Latin "racemus," meaning "bunch," or "cluster." Richardson's dictionary first pointed out this derivation, and we find a record dated 1265 A. D. that the Countess of Leicester paid in London 12 shillings for 14 pounds—with the Latin text "pro uno fraello racemorum"—or "for one frail of bunches."

Some early remarks concerning raisins have been found, among which the most interesting are: 1484 Caxton, *Fables of Aesop* IV., "a foxe ——— beheld the rasyns that grew upon a higher vine"; Shakespeare's *W. T.*, IV, 3.51: "I must have saffron to colour the warden pies, four pounds of prunes and as many raisins"; 1533 Ayot Cost. Helthe (1539) "Raysons do make the stomake firm and strong." Borde in his *Dietary* of 1542, says, "great reaysens be nutrytyve specially if the stones be pulled out."

Origin Lost In Antiquity

We also find Bible references to raisins. Thus in the first book of Samuel, 25th Chapter, 18th verse: "Abigail made haste ——— took loaves ——— and a hundred clusters of raisins"; and in the first book of Samuel, 30th Chapter, 12th verse, mention is made of David's giving an Egyptian two clusters of raisins. Still earlier, in Numbers, 6th Chapter, 3rd verse, The Lord spake unto Moses, "He shall ——— not drink any liquors of grapes, nor eat moist grapes nor dried."

The ancient Egyptians are mentioned as the first people to have cultivated

grapes and to have cured them by the sun for use as winter food. A number of references, however, give Persia, or less specifically, Southwestern Asia, credit as the original home of the raisin. This so-called European grape was the one Noah planted after he left the Ark, and was the kind found in the Promised Land. It is also mentioned that this vine is the variety grown in California—this one species constituting 90 per cent of the grapes grown in the world.

Early travelers found dried and seedless grapes in Asia Minor and there are numerous references to grapes, especially from the time of Homer to the days of Imperial Rome. From Asia, raisin culture gradually spread westward to the countries around the Mediterranean seas, but not to any great extent until mediaeval times. Among famous ancients were the Swiss lake dwellers, living in the stone age perhaps 8000 to 10,000 years ago. Seeds of barley, wheat, apples and grapes have been found in lake bottoms of this region.

In the year 75 A. D. Pliny speaks of small bunches of fine grapes in Greece, referring undoubtedly to the small raisins ordinarily called currants. He even mentions two kinds, "Uva Zibebae" and "Uva Alexandria." The early Latins had "Uva Apiariae," meaning bee grapes—due to their attraction for bees—and also "Ave Muscae"—Musca meaning to fly—perhaps referring to their drawing flies. These were probably the ancestors of our Mucat raisins of the present time.

Raisin Culture of Spain

Malga in Spain has exported raisins since 1295 A. D., but was a producer before that time. Culture was probably begun by the Phoenicians, those most daring mariners among the ancients. The Romans continued this culture for a time but finally abandoned it. The Moors are

credited with having reintroduced the raisin grape into Spain about 800 A. D. The invaders seemed to have considerably more ambition and energy than the usual Moor and the prosperous kingdoms of Granada and Andalusia resulted. The Moors were driven from Spain in the thirteenth century by the Christians—their villages and farms being practically ruined in the battles. Following this, shepherds with their flocks overran the country, politically and otherwise, and agriculture—incidentally raisin culture—had no chance until the passage of new laws about one hundred years ago. For a long time raisin growth and consumption was small and was confined to the Mediterranean regions. In the Eleventh Century the Greeks and Venetians had some traffic in raisins, but they were not a commercial article in Northern Europe until after the Crusades. There were several of these expeditions of English, French, Germans and Italians to the Holy Land, made in an effort to retake Jerusalem and the Holy Land from the Mohammedans. On returning to Europe the Knights brought with them spices, raisins, and many hitherto unknown Oriental foods and luxuries.

Probably raisins had reached England by the beginning of the Thirteenth Century, and were fully established as an article of commerce by the middle of the Fourteenth Century. They remained a luxury, however, until our own time—that is until their development in California during the last 50 years. Thus in 1265 fourteen pounds of raisins were sold for 12 shillings; in 1374 at 2 pence and 3 farthings (said to be \$1.25) per pound.

Originally a Luxury

We hear that raisins imported from Spain to England were prized as a luxury and came chiefly from Malaga, Valencia and Alicante. These were called "greate

reasons" to distinguish them from the currants obtained from Greece. These currants, by the way, are not the ordinary red or black currants which grow in temperate climes, but were unknown to the old Greeks or Romans. We find several references to these currants and their names at different times; 1334, corauntz, 1435, corent; 1463, reysons of Corawnee; 1512, raysn of Corens; 1554, currant. In 1578, Dodens, a Dutch botanist, wrote a book on Horticulture and mentions "small raysens commonly called Corantes but more rightly, raysens of Corinth."

In 1513 there was established the first English consulate at Chios. Then followed direct traffic between Greece and Northern Europe. The name currant evidently came from the town of Corinth, the principal export town for raisins until about 1580, when the Turks conquered Greece. The hostility of the Turks preventing entrance to Corinth, culture was begun in the Ionian Islands and developed rapidly, especially in Zante. This was the origin of the Zante currant.

Chile produces raisins. They were probably introduced by the Spaniards at the time of their conquest of South America. There is also some growth in Australia and various attempts have been made to produce raisin grapes in other parts of the world, but a certain climate is required. Thus the growing area is greatly restricted, as compared to that of the ordinary grape. California and the Mediterranean countries are the chief producers. The story of raisin growing in California will be taken up in a subsequent article.

I have occasion to call frequently on bakers of the Northwest, and I find they all speak highly of the work the American Institute of Baking is doing.

—R. S. WATTS, Seattle, Wash.

Lactic Acid in Bread Making

*Studies at the American Institute of Baking under the Du Pont
De Nemours Fellowship*

IT IS generally recognized that the optimum acidity or hydrogen ion concentration of the dough is one of the most important factors in the fermentation problems of baking. Direct additions of organic acids and acid producing compounds to the dough batch have long been advocated for the purpose of fermentation control, and also for the suppression of the activities of undesirable organisms such as those responsible for the bread infection known as "rope." At present, however, there is little definite information at hand regarding the use and effects of these additions from the standpoint of the practical baker.

Recently through the cooperation of the E. I. Du Pont De Nemours and Company of Wilmington, Delaware, manufacturers of edible lactic acid, a Research Fellowship was established at the American Institute of Baking for the purpose of investigating the applications of lactic acid in breadmaking, so that available information on this subject may be provided for the baking industry. The work of the Fellowship is now in progress and the results of these investigations will be published from time to time in *Baking Technology*.

As an introduction to the studies of the Fellowship, it has been suggested that a brief statement of the properties and preparation of lactic acid would be of considerable interest at this time.

Lactic acid occurs widely distributed in nature as the result of bacterial fermentations. A large number of bacteria are capable of producing lactic acid, which accounts for its wide distribution.

Probably the most generally known

example is that of its formation in the souring of milk, and in buttermilk, where it is the predominant acid. In fact, the name is derived from the Latin "lactis" on account of this association. Likewise, in the tanning industry, it was discovered that lactic acid was the principal acid produced from the fermentation of the tan liquors. For this reason, steps were taken to provide for its commercial production.

In the commercial production of lactic acid, raw materials containing some form of fermentable sugar, or materials containing starch, are most commonly used. In the latter case, the starch is converted into a form of sugar called dextrose, by hydrolysis with an acid. The usual form of sugar is black strap molasses, which is a by-product from the sugar refining industry. This material yields an acid which is dark in color. For the lighter grades of commercial lactic and edible lactic acids, corn starch, such as is used in the household as a food, is taken as a raw material.

The corn starch is converted to dextrose by boiling with the purest grade of commercial sulfuric acid, known to the trade as brimstone acid. It is evident from the very start in the preparation of edible lactic acid that the raw materials themselves are such as are used in the preparation of food products.

The next step in the manufacture, having obtained a pure solution of sugar, is the fermentation, whereby the sugar is converted by the lactic acid bacteria to lactic acid. This is the most important step in the process and requires the greatest care and chemical control. The sugar

solution is diluted to approximately twelve per cent, as it is at this strength that the most efficient fermentation is secured. The sugar solution is introduced into large wooden vats which are mechanically agitated. Calcium carbonate, or as it is commercially known, whiting, is introduced in the proper amount to neutralize the lactic acid as it is formed during the fermentation. This is necessary, as the fermentation will not proceed if the acid content becomes too great.

The mixture is then brought to the proper temperature, and special care is taken to maintain this temperature, as otherwise fermentation will not be successful. The solution is then inoculated with lactic acid bacteria and fermentation begins at once. It is very important to have the proper kind and purity of bacteria, for on this point depends the subsequent purity of the acid. Contamination, or the presence of an impure culture, will produce butyric acid, the odor of which is very objectionable in a food product.

The fermentation proceeds at a rapid rate, and usually takes from 9 to 12 days. At the end of this period, the sugar has been converted into lactic acid, which in turn has been neutralized by the calcium carbonate, forming calcium lactate. The lactic acid is now freed from the calcium salt by precipitation of the calcium with pure sulfuric acid. Insoluble calcium sulfate is formed, which is filter-pressed, leaving a pure, weak lactic acid. This acid is now drawn to a vacuum evaporator where it is concentrated to the desired strength.

In the production of edible lactic acid the greatest care must be exercised to produce an acid which will be free from metallic impurities. Even with the greatest care and selection of the appropriate kind of equipment, it is necessary to re-

move them. The lactic acid, therefore, is given a special treatment during the process by which these impurities are eliminated. The treated acid conforms to the pure food specifications.

Lactic acid is thus an organic acid produced by fermentation. It possesses a mild, pleasing taste in contrast to the sharp, biting taste of acetic acid, the acid of vinegar.

It is the predominating organic acid of dough fermentation, and the acidity of dough and bread is largely due to this acid.

Lactic acid solutions produced by fermentation may be refined to a high degree of purity, so that a colorless, odorless, syrupy liquid is obtained containing from 85 to 90 per cent total lactic acid as required by the United States Pharmacopoeia. It is soluble in water, alcohol and ether, but insoluble in chloroform, petroleum ether or carbon disulphide.

The edible lactic acid used extensively in the manufacture of food products, such as jams, jellies, beverages, bread and other cereal products, usually contains less than 50 per cent total lactic acid. Analytical methods and specifications for lactic acid for use in baking will be discussed in later articles.

Lactic acid occurs naturally in many human foods, and is an ideal acid for human consumption, as has been demonstrated by considerable physiological research.

—C. B. Morison,

Research Dept., American Institute of Baking.

From now on we hope to have a more active part in the Association. The work of the Institute, as described to us in *Baking Technology*, is very timely and should be inspirational to all who read it.

—Grocers Baking Co., Louisville, Ky.

Formulas for Milk Bread

How To Calculate Them To Obtain Legal Standard Milk Bread With Various Types of Prepared Milk

By VICTOR E. MARX

Instructor School of Baking, American Institute of Baking

MILK BREAD is a definite, standardized product. It must contain milk solids and butter fat in fixed amounts.

The formulas devised by V. E. Marx, which are printed herewith, make it easy to calculate the amounts of dry and condensed milks necessary to make legal milk bread.

But before they can be used the baker must know the analysis of the milk he is buying; that is, the milk solids not fat, and the butter fat of dry milks, and in sweetened condensed milk, the moisture and sugar as well.

If this data is not furnished by the manufacturer it can be obtained by a chemical analysis from any good chemist or from the service laboratories of the American Institute of Baking.

MILK BREAD

The question of quantity of milk required for milk bread is one which frequently puzzles the baker. According to the Government Standard, a loaf of bread to be called milk bread, must contain at least one-third of the wetting ingredients as milk. This does not mean that whole raw milk must be used, but that milk solids in sufficient quantity to be the equivalent of one-third of the wetting ingredients must be present. For a full milk loaf it is necessary to add the equivalent of all whole raw milk with no added water. This may be supplied in many ways, such as by the use of powdered whole milk, powdered skimmed milk and butter, sweetened condensed milk and butter, or sweetened condensed milk, powdered skimmed milk and butter.

ABSORPTION

The average absorption of hard spring wheat flour, such as used in the manufacture of bread, is about 60%. That is, 60 lbs. of water is used for every 100 lbs. of flour. If this same average

flour was made into a full milk loaf using whole raw milk only, the quantity of milk necessary to make a dough of the same stiffness as 60 lbs. of water would be about 65 lbs.

Whole Raw Milk has an average analysis of about the following:

Water	88.0%
Fat	3.5%
Milk solid not fat.....	8.5%
<hr/>	
100.0%	

This means that in a dough taking 65% absorption with whole raw milk, the fat content is $3.5\% \times 65\%$ or 2.275%. The solids not fat present, would be $8.5\% \times 65\%$ or 5.525%.

POWDERED WHOLE MILK

Of all the milk products, powdered whole milk is the most constant in its composition. The approximate average composition of whole powdered milk is:

Solids not fat.....	69%
Fat	28%
Water	3%
<hr/>	
100%	

This means that if 8% powdered whole milk is used in the dough, it will have enough milk solids to be equivalent to full milk, because $8\% \times 69\% = 5.52\%$ solids not fat, and $8\% \times 28\% = 2.24\%$ fat. It is generally accepted in the industry that a loaf made from a dough containing 8 lbs. powdered whole milk per 100 lbs. flour is the equivalent of a full milk loaf.

RELATIONSHIP

Many times it is necessary to calculate the quantities of powdered skimmed milk, sweetened condensed milk, or butter necessary to give the equivalent of full milk bread. It is impractical to use an average analysis for any of these products, because they vary so widely. We have powdered skimmed milk, half skimmed powdered, whole sweetened condensed, partially skimmed sweetened condensed, and many other kinds of milk products with widely different composition. It was, therefore, thought to be of value to devise a general formula for the amount of each of these products required to make full milk or Government standard milk bread.

DERIVATION OF FORMULAS

Let the following letters represent the analysis of various products:

	Powd. Whole Milk	Powd. Skimmed Milk	Sweet'd Cond. Milk	Butter
Solids not fat	A%	D%	H%	P%
Butterfat	B%	E%	J%	M%
Water	C%	F%	K%	N%
Added sugar			L%	

Normal sugar content of dough R%.

POWDERED SKIMMED MILK AND BUTTER

On the basis of solids not fat $A : D :: \times : 8$.
 $\times = \frac{8A}{D}$. This means that $\frac{8A}{D}$ % P. S. M. is equivalent to 8% P. W. M.

In $\frac{8A}{D}$ % P. S. M. there is $\left(\frac{8A}{D} \times \frac{E}{100} \right)$ % butter fat.

The total butter fat required = $8\% \times B$.

Therefore the amount of butter fat to be added

$$= .08B - .08 \frac{AE}{D} = .08 \left(B - \frac{AE}{D} \right) \text{ or}$$

$$.08 \left(B - \frac{AE}{D} \right) \% \text{ butter fat.}$$

In order to get this much butter fat it is necessary to use .

$$.08 \left(B - \frac{AE}{D} \right) \times \frac{100}{M} = 8 \left(B - \frac{AE}{D} \right) \% \text{ M}$$

butter.

For Government standard bread divide result by 3.

If the average figures of Powdered Whole Milk are adopted they become $\frac{552}{D}$ % P. S. M. and

$$224 - \frac{552E}{D} \% \text{ butter.}$$

M

Example:—As an example of the use of this formula, let us take an average skimmed milk powder. This analysis is taken from the Farmers Bulletin No. 1207, "Milk and its uses in the Home," published by the U. S. Dept. of Agriculture.

Milk solids not fat.....	94.0% (D)
Butter fat	2.0% (E)
Water	4.0%
	100.0%

$$\frac{\% \text{ Powdered Skimmed Milk required} = 552\%}{D} = \frac{552}{94} = 5.87\%.$$

$$\% \text{ Butter (85\% fat M) required} = \frac{E}{D} = \frac{224 - 552}{94} = \frac{552 \times 2}{94} = 2.49\%.$$

To show what a saving can be effected by using this formula in conjunction with the analysis of the skimmed milk powder, let us take the case of a sample sent to the Institute Laboratories. Its analysis follows:

Milk solids not fat.....	92.44% (D)
Butter fat	4.20% (E)
Water	3.36%
	100.00%

$$\frac{\% \text{ Powdered Skimmed Milk required} = 552\%}{D} = \frac{552}{92.4} = 5.97\%.$$

$$\% \text{ Butter (85\% fat M) required} = \frac{E}{D} = \frac{224 - 552}{92.44} = \frac{552 \times 4.2}{92.44} \% = 2.34\%.$$

A saving of .15% butter and a loss of .1% P. S. M. On the basis of 10,000 lbs. of flour per day this means a saving of 15 lbs. butter and a loss of 10 lbs. P. S. M. With butter at 50c per lb. and P. S. M. 12c per lb., this would show a net gain of \$7.50—\$1.20 or \$6.30 per day.

SWEETENED COND. MILK AND BUTTER

On the basis of solids not fat $A : H :: \times : 8$.

$\times = \frac{8A}{H}$. This means that $\frac{8A}{H}$ % S. C. M. is the equivalent of 8% P. W. M.

In $\frac{8A}{H}$ % S. C. M. there is $\left(\frac{8A}{H} \times \frac{J}{100} \right)$ % butter fat.

Total butter fat needed = $8\% \times B$.

$$\text{Butter fat to be added} = .08B - .08 \frac{AJ}{H} =$$

$$.08 \left(B - \frac{AJ}{H} \right) \% \text{ butter fat.}$$

In order to get this much butter fat it is necessary to add

$$.08 \left(B - \frac{AJ}{H} \right) \times \frac{100}{M} = 8 \left(B - \frac{AJ}{H} \right) \% \text{ butter M}$$

$$\text{In } \frac{8A}{H} \% \text{ S. C. M. there is } \frac{8A}{H} \times \frac{L}{100} \text{ or } \frac{8AL}{100H} \% \text{ sugar (which is usually excessive).}$$

$$\text{Water to be subtracted} = \frac{8A}{H} \times \frac{K}{100} = \frac{8AK}{100H} \%.$$

If the average analysis of P. W. M. is adopted these formulas become

$$\text{S. C. M.} = \frac{552}{H} \% \quad \text{Butter} = 224 - \frac{552J}{H} \%$$

$$\text{Sugar} = \frac{552L}{100H} \% \quad \text{Water} = \frac{552K}{100H} \%$$

Example:—As an example of the use of this formula let us take an average whole sweetened condensed milk whose analysis is:

Milk solids not fat.....	23.0% (H)
Butter fat	9.0% (J)
Water	28.0% (K)
Added sugar	40.0% (L)
	100.0%

$$\% \text{ S. C. M. required} = \frac{552}{H} \% = \frac{552}{23} \% = 24\%.$$

$$\% \text{ Butter (85\% fat M) required} = 224 - \frac{552 \times J}{H} \% = 224 - \frac{552 \times 9}{23} \% = .09\%$$

or practically 0.

$$\% \text{ Sugar present} = \frac{552L}{100H} \% = \frac{552 \times 40}{100 \times 23} = 9.6\%$$

$$\% \text{ Water to be taken out} = \frac{552K}{100H} \% = \frac{552 \times 28}{100 \times 23} = 6.72\%.$$

A sample of whole sweetened condensed milk analyzed by the American Institute of Baking laboratories showed the following analysis:

Milk solids not fat.....	20.68% (H)
Butter fat	7.84% (J)
Water	26.81% (K)
Added sugar	44.67% (L)
	100.00%

$$\% \text{ S. C. M. required} = \frac{552}{H} \% = \frac{552}{20.68} = 26.7\%.$$

$$\% \text{ Butter (85\% fat M) required} = 224 - \frac{552 \times J}{H} \% = 224 - \frac{552 \times 7.84}{20.68} \% = 17\%.$$

$$\% \text{ Sugar present} = \frac{552L}{100H} = \frac{552 \times 44.67}{100 \times 20.68} = 11.92\%.$$

$$\% \text{ Water to be taken out} = \frac{552K}{100H} \% = \frac{552 \times 26.81}{100 \times 20.68} = 7.15\%.$$

This means that if a baker was using the above sample and then bought the standard product whose analysis was shown first, he would make a saving of 2.7% S. C. M. and .07% butter, besides cutting the sugar present from 11.92% to 9.6%. On the basis of 10,000 lbs. flour per day, with S. C. M. at 12c per lb. this would mean a saving of 270 lbs. S. C. M. or \$32.40 and 7 lbs. butter or \$3.50 making a total saving of \$35.90 per day besides cutting the excess sugar in the dough.

SWEETENED CONDENSED MILK, POWDERED SKIMMED MILK AND BUTTER

$$\% \text{ S. C. M. required to give R\% sugar} = \frac{R \times 100}{L}$$

% S. C. M.

$$\text{In } \frac{100R}{L} \% \text{ S. C. M. there is } \frac{100R}{L} \times \frac{H}{100} \text{ or } \frac{RH}{L} \% \text{ solids not fat.}$$

% solids not fat.

Solids not fat required for full milk bread = 8% of A.

$$\text{Solids not fat to be added} = .08A - \frac{RH}{L}$$

P. S. M. required to furnish this =

$$\left(.08A - \frac{RH}{L} \right) \frac{100}{D} \% \text{ P. S. M.}$$

Fat needed for full milk bread = 8% × B.

$$\text{Fat in } \frac{100R}{L} \% \text{ S. C. M.} = \frac{100R}{L} \times \frac{J}{100} = \frac{RJ}{L} \% \text{ fat.}$$

% fat.

Fat in P. S. M. =

$$\left(.08A - \frac{RH}{L} \right) \frac{100}{D} \times \frac{E}{100} = \frac{E}{D} \left(.08A - \frac{RH}{L} \right)$$

$$\text{Total fat added} = \frac{RJ}{L} + \frac{E}{D} \left(.08A - \frac{RH}{L} \right)$$

Fat to be added as butter = .08B —

$$\left[\frac{RJ}{L} + \frac{E}{D} \left(.08A - \frac{RH}{L} \right) \right]$$

$$\text{Butter to be added} = \frac{100}{M}$$

$$\left[.08B - \left(\frac{RJ}{L} + \frac{E}{D} \left(.08A - \frac{RH}{L} \right) \right) \right] \% \text{ butter}$$

$$\text{Water to be subtracted} = \frac{100R}{L} \times \frac{K}{100} =$$

$$\frac{RK}{L} \% \text{ water.}$$

For Government standard bread divide result by 3. If average analysis of P. W. M. is adopted these formulas become: P. S. M. =

$$\left(5.52 - \frac{RH}{L} \right) \frac{100}{D} \%$$

$$\text{Butter} = \frac{100}{M} \left[2.24 - \left(\frac{RJ}{L} + \frac{E}{D} \left(5.52 - \frac{RH}{L} \right) \right) \right]$$

Example:—As an example of the use of this formula let us take an average skimmed sweetened condensed milk. The analysis is taken from Leach "Food Inspection and Analysis," page 187.

Milk solids not fat.....	26.09% (H)
Butter fat	3.06% (J)
Water	30.70% (K)
Added sugar	40.15% (L)

100.00%

The average P. S. M. is used.

Normal sugar content of the dough (no other sugar used) = 4%.

$$\% \text{ S. C. M. required} = \frac{100R}{L} \% =$$

$$\frac{100 \times 4}{40.15} \% = 9.96\%$$

% P. S. M. required =

$$\left(5.52 - \frac{RH}{L} \right) \frac{100}{D} \% = \left(5.52 - \frac{4 \times 26.09}{40.15} \right)$$

$$\frac{100}{94} = 3.12\%$$

$$\% \text{ Butter (85\% fat M) required} = \frac{100}{M}$$

$$\left[2.24 - \left(\frac{RJ}{L} + \frac{E}{D} \left(5.52 - \frac{RH}{L} \right) \right) \right] \% = \frac{100}{85}$$

$$\left[2.24 - \left(\frac{4 \times 3.06}{40.15} + \frac{2}{94} \left(5.52 - \frac{4 \times 26.09}{40.15} \right) \right) \right] = 2.21\%$$

If in place of this sample of skimmed sweetened condensed milk another sample submitted to the American Institute of Baking Laboratories was used according to the following analysis, these quantities would be required:

Milk solids not fat.....	29.16% (H)
Butter fat	2.30% (J)
Water	27.92% (K)
Added sugar	40.62% (L)

100.00%

$$\% \text{ S. C. M. required} = \frac{100 \times R}{L} \% =$$

$$\frac{100 \times 4}{40.62} = 9.84\%$$

% P. S. M. required =

$$\left(5.52 - \frac{RH}{L} \right) \frac{100}{D} \% = \left(5.52 - \frac{4 \times 29.16}{40.62} \right)$$

$$\frac{100}{94} = 2.81\%$$

$$\% \text{ Butter (85\% fat M) required} = \frac{100}{M}$$

$$\left[2.24 - \left(\frac{RJ}{L} + \frac{E}{D} \left(5.52 - \frac{RH}{L} \right) \right) \right] \% = \frac{100}{85}$$

$$\left[2.24 - \left(\frac{4 \times 2.30}{40.62} + \frac{2}{94} \left(5.52 - \frac{4 \times 29.16}{40.62} \right) \right) \right]$$

$$= 2.3\%$$

This shows a saving of .12% S. C. M., .31% P. S. M. and a loss of .09% butter. On the basis of 10,000 lbs. flour a total gain of 12 lbs. S. C. M., 31 lbs. P. S. M., and a loss of 9 lbs. butter valued at \$1.44 and \$3.72—\$4.50 or a net gain of \$0.66 per day would be effected.

It must be remembered that these samples used for purposes of calculation are not abnormal, freak samples, but samples sent to the Institute by bakers who are using them.

At any rate the general formula proves:

(1) That the saving of cost in the use of milk products may be very large if carefully calculated quantities are used.

(2) That all milk products should be analyzed.

(3) That no rough calculation is accurate enough for the baker who is efficient.

(4) That in a few minutes' time, by the use of ordinary arithmetic, the exact value of any milk product can be determined according to how it is to be used in the dough.

(5) That all bakers should adopt this method of calculating the quantity of various milk products to be used in all kinds of milk breads.

Books for the Baking Laboratory

THE PHYSICO-CHEMICAL PROPERTIES OF STRONG AND WEAK FLOUR. R. A. Gortner and P. F. Sharp. Reprinted from the Journal of Physical Chemistry, v. 27, pp. 481-492, 567-576, 674-684, 771-788 and 982-987—May, June, Oct., Nov., and Dec., 1923.

III. Viscosity as a measure of hydration capacity and the relation of the hydrogen-ion concentration to imbibition in the different acids.

IV. The influence of the ash of flours upon the viscosity of flour-in-water suspensions.

V. The identity of the gluten protein responsible for the changes in hydration capacity produced by acids.

VI. The relation between the maximum viscosity obtainable by the addition of lactic acid and the concentration of flour-in-water suspensions.

VII. The physical state of the gluten as influencing the loaf volume.

This collection of five contributions to the science of flour strength completes the reports on a series of collective studies on strength factors in flour which were begun in the Division of Agricultural Biochemistry, University of Minnesota, late in 1920. They will constitute a most valuable library addition.

While these papers deal largely with the relationship of gluten quality to flour strength in terms of colloidal properties, the experimental data and the conclusive results are so clearly stated that there can be no mistaking their meaning. Some conclusions arrived at in earlier work were confirmed, and new results have more sharply defined the different factors which must be considered as working together to produce a flour of good or poor bread-making qualities.

These authors have demonstrated that instead of gliadin, as was generally supposed, it is the glutenin part of gluten which possesses those physico-chemical properties that are mainly responsible for the changes in imbibition under the action of acids. This conclusion has likewise been later confirmed by Woodman.

The flour strength, in so far as the colloidal properties of the gluten are concerned, is apparently dependent upon the quality of the glutenin. The MacMichael viscosimeter was used for most of the data, with viscosity readings based on a definite experimental procedure which was adopted and vigorously adhered to.

The addition of various amounts of different acids to suspensions of flour in water produced differing degrees of change in viscosity, but the

maximum effects of all acids occurred at approximately the same acidity, namely, at a hydrogen-ion concentration of roughly $\text{CH X } 10^{-3}$ (a pH of 3.0). After removing the electrolytes, the soluble ash content of the flour, by washing out with water, a marked increase in imbibition was produced by much smaller amounts of acids, indicating that those electrolytes had appreciable buffer action. Experiments both with extracted and unextracted flour suspensions gave data which shows "that the salts present in the flour exert an effect which differs from flour to flour, indicating that the various electrolytes occurring in the various flours are present in different proportions."

"It was found that if the logarithms of the maximum viscosity readings were plotted against the logarithms of the flour concentration, the points fell in a straight line." The logarithmic equation of these straight lines showed different tangent angles, and permitted the calculation of certain constants. The values of these constants appear to fall into three groups, and although the eleven flours studied did not furnish efficient data on which to base final conclusions, there seems to be a definite relationship within each group between the glutenin content, its measured imbibitional properties, and the strength of the flour in terms of loaf volume and baking strength. Seventeen figures illustrate the experimental results and numerous tables accompany the text.

It is to be hoped that more research of this nature will help to clarify our working knowledge of the factors which control the baking strength of flour in the bake shop.

—L. A. R.

COLLOID SYMPOSIUM MONOGRAPH. Papers and Discussions presented at the National Symposium on Colloid Chemistry held at the University of Wisconsin June, 1923. Edited by J. Howard Mathews. 419 pages. Published by the Department of Chemistry, University of Wisconsin, Madison, 1923.

Those interested in colloid chemistry will find much valuable information in this monograph, with its many contributions and discussions from some of the foremost workers in this field. The paper by Dr. Gortner of Minnesota on "The Application of Colloid Chemistry to Some Agricultural Problems" contains considerable information which is of interest to the cereal chemist in baking and milling.

Like all meetings of colloid chemists, the

National Symposium at Madison was most provocative of individual discussion and opinion, and the reader of the monograph will doubtless be left with the impression that colloid chemical ideas are in a most active stage of fermentation. The next Colloid Symposium will be held at Northwestern University in June of the present year, with promises of another enthusiastic meeting.

—C. B. M.

CEREAL CHEMISTRY. Volume 1, No. 1, January, 1924. Formerly The Journal of the American Association of Cereal Chemists. 63 pages.

The recent reorganization of the American Association of Cereal Chemists to include the membership of the American Society of Milling and Baking Technologists has made it possible to publish a new bi-monthly journal entitled Cereal Chemistry, which now supersedes the original journal of the American Association of Cereal Chemists.

The first issue, under the editorial direction of Prof. C. H. Bailey of the University of Minnesota, has appeared and contains a number of interesting contributions which are a most promising beginning for the new journal. Prof. Bailey has associated with him on the editorial board an assistant editor, a managing editor, and four associate editors.

The articles include a stimulating paper on the Cereal Chemistry of today, by M. J. Blish of the Nebraska Agricultural Experiment Station and President of the American Association of Cereal Chemists, which is followed by several research papers of much interest.

All chemists working in the cereal field will look forward to future issues of Cereal Chemistry, and Baking Technology extends its best wishes and congratulations to the new journal.

—C. B. M.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Yeast; diastase; bread. International Takamine Ferment Co. Brit. 201,512. Nov. 27, 1922. A yeast stimulant, especially for use in making bread, is made by boiling bran in H_2O , to which a small quantity of HCl may be added, and filtering. The filtrate may be concentrated, either to a sirupy consistency, when sugar may be added, or to dryness. The extract may be treated with diastase which has been freed from proteoclastic enzymes by preparation with such salts as $CaCl_2$, $FeSO_4$, or $AlCl_3$. Remaining pro-

teoclastic enzymes may be removed by concentrating the diastase solution at 80 degrees in vacuo to about $\frac{1}{3}$ of its original volume.

The contamination of milling wheat. The effects of strong-scented weed seeds. Anon. Agr. Gaz. N. S. Wales 34, 628 (1923).—Bread baked from wheat contaminated with 3% by count of Hexham scent or Bokhara clover seed possessed the characteristic odor of the weed. With 1% contaminated wheats it was doubtful whether the characteristic scent could be detected in the bread.

K. D. Jacob.

The detection of tar dyes, used for coloring food. T. Oshima. J. Pharm. Soc. Japan. No. 500, 753-60 (1923).—The results are given of the detection of tar dyes used for coloring matter analyzed in the Imperial Osaka Hygienic Laboratory during the last eleven years. An extensive summary on analysis of these dyes in cakes and candies is added. Out of thirty dyes eight were pointed out as toxic.

S. T.

The occurrence of dyes in bread. E. Arbenz. Mitt. Lebensm. Hyg. 14, 307-11 (1923).—Bread is sold at times in which colored spots occur. Formerly the spots were usually red, but recently blue or violet spots are more frequently found. The cause has been variously attributed to dyes, use of colored marking pencils in mills and bakeries, grain smut spores or other microorganisms, etc. Samples of bread with violet spots in the loaf and of flour from the same source were examined. The flour showed no appreciable amount of coloring matter. The colored portions were dissected from the loaf and an attempt was made to identify the color by the usual methods. The results indicated a dye of the Me-violet group, but the color was not soluble in H_2O , $EtOH$ or $AmOH$. Other possible colors having been eliminated as causes by various methods, resort was had to baking tests in which Me-violet, bits of marking pencil, and of indelible pencil were added to the test loaves. The results showed that Me-violet, and perhaps other organic dyes, combined with the bread constituents to form insoluble compounds. Colored pencils gave but traces of color, and in many cases green, not violet or blue, spots were obtained.

E. F. Almy.

Sources of Iodine in our food supply. S. Woodruff. J. Home Econ. 15, 33-4 (1923).—A summary.

H. G.

The Case For Quality Flour

I HAVE before me a laboratory report on two samples of flour. Just what does it tell me? The first thing that I notice is that the baking tests on these samples produced loaves that scored 91 and 92.5 respectively. I see further that the average score of all bread resulting from baking tests for the last month was 89.7. Therefore, I see at once that these two samples made better bread than that made by the average flour in use at the present time.

However Sample No. 2 shows up a little better than No. 1. Turning to the second page of the report, I find the detailed score, in which each loaf was given 10 for volume and 8 for color of crust. This means that each flour had sufficient strength to make a loaf of satisfactory volume and crust color.

In the case of commercial bread, we are scoring not only the flour and other materials used, but also the baker himself, and the shop in which the bread is made, and any faults due either to materials or men should be penalized.

Going back to the two samples of flour under consideration, I notice that in break and shred, one of them received 2 points and the other 2.5 points. This means that one flour gave a break that was ragged and irregular, while the other gave a good break that was well shredded. This shows us that the gluten of one of these flours was not strong enough to give a good break without tearing, while the other one evidently had a stronger gluten.

Going on to the item of grain, I see that No. 2 scored half a point higher than No. 1, and it also had the same advantage in texture. These two items also indicate that No. 2 was slightly the bet-

ter, because it must be remembered that each flour was handled as nearly as possible according to its requirements.

Now, referring to the chemical analysis on the last page, I see that one has a moisture content of 11.25 per cent and the other 12.75 per cent. Referring back to the first page, I find a formula for each flour in which the moisture content is reflected in the absorption, one formula calling for 60 pounds of water and the other 58 pounds. The moisture is well within the limit of 13.5 per cent so that there is no complaint on that point.

The analysis shows sample No. 1 to have an ash content of .44 per cent and protein of 11.15 per cent, while sample No. 2 had an ash of .41 per cent and protein of 10.85 per cent.

Remembering that No. 1 had a score of 91, and No. 2 a score of 92.5, I am led to the conclusion that No. 2, having a smaller amount of gluten, must have a better quality of gluten, and having a lower ash is probably a shorter extraction, or higher patent flour, or it may be that it was milled from a slightly higher grade of wheat.

I am not, however, greatly concerned with the question of whether either of these flours is a long or short patent, or whether they are milled from Northwestern or Southwestern wheats. The point that I am interested in is that they are capable of producing high quality bread in the laboratory, and I am reasonably sure that when a baker has ordered them and has them in his shop, they will give him no trouble.

—O. W. Hall,

Technical and Service Dept., American
Institute of Baking.

BAKING TECHNOLOGY

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The Drive Behind Quality

BECAUSE Richard Wahl and more than 150 other managers of production work in American bakeries saw the problem of quality bread as a national problem, in which the whole output of all America bakeries was the unit to be considered, there is now in existence a Society of Bakery Engineers. Its first most basic object "is to get behind every individual production manager in the country and pull him

out of any and every difficulty that he may face." At this writing the new Society, which was formed at a three-day conference at the American Institute of Baking held on March 17, 18, and 19, has

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over 150 applications for membership from bakery production managers, and it is considered a mere infant that as yet is barely born. Its work still lies almost entirely ahead of it. The first task assigned is one of collection of data. Capable men who have had long experience with such problems as buying oven fuels, controlling the time of fermentation for various types of dough, placing bakery machinery, and

studying the controllable factors of production costs, are now at work writing papers which will place their specialized knowledge at the call of the Society as a whole, or of any individual member.

The dissemination of this information will be taken up as the second move in the Society's development, and out of this will grow a new Literature of Bread Production. It will deal with the Science of Bread Production as the older literature dealt with the Craft of Bread Production, when baking processes were considered to be mechanical and not biological and chemical in nature.

Richard Wahl set the key-note for the new Society when he announced that he, personally, joined the Society of Bakery Engineers with a view of "throwing into the common pot" every bit of information and technique he had learned through his years in bakery production work. Practically every production manager who attended the first meeting of the Society entered its service in the same spirit. Mr. Wahl, it may be well to state for the benefit of those who are not familiar with his career, is a former teacher. The teaching instinct is strong in him, for he inherited it from his father, Dr. Robert Wahl, one of the builders of the Wahl-Henius Institute of Fermentology.

After American Bakers Association bought the Wahl-Henius Institute, Mr. Wahl did not become a stranger within its doors, for he was production manager of Regan Bros., bakers of Minneapolis, and was making his mark in the world through his great success in that field.

Balanced Executive Board

He came back to the Institute his father had helped to build as an advocate of new and scientific advance in bread making, through the forming of the Society of Bakery Engineers, which honored him by electing him as its first president. In this particular he was no different from the others who came to make common cause of disseminating information as to the best processes of baking bread so that

all production managers could have the benefit of this knowledge.

In Edward O'Connell, first vice-president, the Society gained the services of a production manager who had been doing for the Corby Company in Washington just the work Richard Wahl was assigned to do for Regan Bros., Minneapolis. He has matured through many years an intimate working knowledge of the principles of modern scientific baking which he now makes available to every production manager who joins the American Society of Bakery Engineers.

In W. E. Doty, of Los Angeles, as second vice-president, the Society gained another officer who can help to guide it in the direction it must go to become of the greatest possible service to the future American loaf of bread. He has been in charge of production for the Franco-American Baking Co. for many years, and came to the initial Society meeting as a representative of the Southern California Association of Production Managers. He carried back to them at once the definite data of the first meeting with details as to how they can be used in each bakery to produce the best results.

A Nucleus for Growth

At this writing the drawing up of the by-laws is progressing in the hands of the Executive Committee, while applications for membership are coming in with every mail. That is what each baker can now do to put his influence behind this Society. He can see that the application of his production manager is sent in to Victor E. Marx, secretary, at 1135 Fullerton Ave., Chicago. A large roll call during the first year will show the devoted men who have launched this movement that they have not seen beyond their times and have not done something that is considered "visionary," and beyond the needs of practical men.

They count on a membership five or six times the mere nucleus of 150 now enrolled. All who join during the present year are to be considered charter members so that they will always be able to recall that they were in at the start of a pioneer movement that should grow through the years to be of more and more importance.

Just so chemists still living count among the greatest honors of their lives that they were charter members of the American Chemical Society, and helped to launch it upon its great career of usefulness in American scientific affairs.

And how useful this society has become. Among other things it has prepared and distributed the greater works of scientific advance. In the School of Baking of the American Institute of Baking a discussion arose among students as to the role of yeast in bread. It was immediately suggested that the discoverer of yeast's role was Louis Pasteur and that if the students desired to know just what the work of Pasteur amounted to for the baking industry, in the light of all other applications of Pasteur's discovery in other fields, they should read the American Chemical Society's edition of Vallery-Radot's wonderful biography of Pasteur. That afternoon a total of twenty-one students of the School sent in an order for copies of this book—one for each student.

Similarly the American Chemical Society distributed thousands of copies of the remarkable volume, "Creative Chemistry," by Edwin E. Slosson. Editors found in the volume material to inspire their minds, so that a knowledge of chemistry's role in the world was distributed to millions of people through this one bit of enterprise.

To Collect Data

In exactly that way the data of bread production will be collected through the

American Society of Bakery Engineers and will be distributed in a way to do the utmost possible good. Those who join the Society at its start can carry forward through all the years of its development a satisfying knowledge that they helped in their professional capacity as bakery production managers.

One of the most earnest and hard-working of the founders of this Society is Julian M. Livingston, chairman of the Institute Committee of American Bakers Association. Mr. Livingston sketched to some of those who will carry its work forward the vision of its possibilities that made him put his time and energy behind the work of its initial development.

"We can all remember back," he said, "to the day when medical knowledge was very little organized. There was no American Medical Association to codify known knowledge and accumulate data until the best technique in each field could be made available to the medical profession. In those days, if a child became ill, every woman of the neighborhood felt at liberty to come in and state the remedy that somebody else had told her about. Old women, in fact, were more often called in than professional practitioners of medicine. The mid-wife was more known in maternity cases than the physician.

Medical Association Precedent

"But the American Medical Association was formed. Professional knowledge was sifted out—the genuine from the spurious. Herbs long depended upon were found to be without curative qualities. They were abandoned, and with them went the quacks who had grown rich advocating their use. Knowledge that met the test of the scientific laboratory was glorified and distributed to all. Now nobody calls in an old woman any more, in case of sickness. Even the family doctor is

little relied on. The surgeon and physician, known to be specialists in their respective lines, are trusted as never before with the healing of the sick.

"That is what I see ahead of the Society of Bakery Engineers. They are the professional men of the baking industry, and will bring together its soundest data, and make it possible to apply this data in all parts of the industry. To be a charter member is surely an honor any production manager will learn to covet more and more as the years pass."

There has been some discussion as to memberships. It should be known that they are individual and cannot be taken out in the name of a baking plant. Any baking plant can be represented by as many members as can qualify under the rules of the Society which admits men in charge of bakery production work or men whose training and vocation make them of special service in bakery production.

The Case of the Ash Pit

One small sample of service to production managers growing out of the first meeting, may give an idea of the benefits of exchanging such information as was there exchanged. Someone asked if water in ash pits was desirable. Many replied they had not thought of it one way or the other. But one production manager reported that his first set of grates burned out in a year. Thereafter he put a water container in the ash box and his next set of grates had already lasted three years, and they were still good. He pointed out how the water cooled off the red hot coals and clinkers before they could reradiate heat in a way to damage the grates. Two attendants at the conference have since reported that they installed water pockets in their ash boxes as soon as they reached their plants.

"Mr. Martin and Mr. Angus certainly

feel that the time spent at the conference was well spent," write Shelly Bros., of Vancouver, Canada, on the return of the two delegates they sent to the Chicago meeting. "The information they brought has been of immediate value to us. We have already had a two-hour session and expect to have two more profitable ones in the discussion of their data."

Thus the new Society launches itself for consideration of the baking industry. If any member gets into any trouble at all over any unsolvable problem, President Wahl wants to hear from him. He insists that the entire resources of the Society are behind the desire to "get him out" and bring the best known light in the industry to bear upon his problem.

Electrified!

I am particularly attracted to the stand leaders of the baking industry are taking towards the building up of the American Institute of Baking. I have visited among bakers in connection with the Toast Campaign, and I have found some who drag back. It seems to me they ought to be pretty well ashamed by this time, as results have come forth from cooperative effort. With an objective such as the Wheat Council had in developing co-operation for bakers among other industrial groups, I should say that a baker who will not identify himself with his own organized associates has a very small perspective of the possibilities for growth within the baking industry.

—H. A. Lane, Secretary Joint Committee for Business Development of the Electrical Industries.

We are always glad to hear that some baker from the territory we cover has gone to Chicago to attend the School of Baking. The future of the industry is assured if a goodly number attend this School.

—T. F. Naughtin, Omaha, Neb.

Mr. Quick on Bread

HERBERT QUICK is one of the master writers of to-day—of fiction. Recently he has been writing about bread—and about Basil Manly's charges that a bread trust is about to overwhelm America and make certain people "see red."

Mr. Quick is different from many writers in that he commands the services of many newspapers at once. His syndicate articles are very widely read. He writes books which climb up among the "best sellers" of our day. In writing about bread he suspected that charges of a bread trust would probably prove true and he suggested that a co-operative bakery in each city be organized to disburse the profits among the bread consumers—co-operatives called "consumer co-operatives" work that way. Dividend checks go to consumers of the product instead of the builders of the bakery—except that the consumers themselves set up the bakery by original stock subscriptions, so much for each person expecting to trade there and participate in the profits.

At the American Institute one of us did not think much of Mr. Quick's plan, for the reason that in former years he had invested in many such co-operatives and all had failed, swallowing 100 per cent of the original money subscriptions of their backers.

So letters were written to Mr. Quick, calling attention to the other field of co-operation that lies fallow in the case of wheat. This is the co-operation that is practiced in California by the orange growers. They realize that retailers can market their crop better than they ever can, and so create a market over each retailer's head, by advertising the product in his neighborhood. Then they "glorify oranges" in many ways, and at the end of a period of effort find they have "pushed the peak of market absorption"

from 5,000 carloads a year to 60,000 carloads a year. A crop of this size is now being marketed successfully.

It was suggested that the California producers worked on the theory that the "real merchandisers of our goods are those who sell to ultimate consumers."

Just so the real merchandisers of America's wheat crop are those who sell it in the form it is consumed—in the form of baked goods. Yet, we suggested to Mr. Quick, the wheat farmer has no conception of the potentialities of co-operating with the baker, instead of standing off on the farm and pot shooting him with every kind of wierd charge, without the slightest first-hand investigation.

We asked if such co-operation could ever be dreamed of as possible—in which wheat farmers would get some of the open-mindedness and co-operative spirit of joint service with the baker, that today put "more raisins into bread," for instance "than have been used in bread in any other year." We sketched how the backing of the baker by the Fresno raisin growers brought this about. And asked why the farmer so often,—and especially editors catering to farm readers—felt they were serving the farmer by reviling the bakers when there was such an enormous task for both to do together. We sketched how the Wheat Council was born to tackle this great task and was made the target for many arrows loosed at it in ignorant rancor, that only in the end spelled ill for their senders, and not for their target.

Mr. Quick responded splendidly. He saw the importance of co-operative work and of recognition of the baker as one step from farm to consumer. The vision of **quality** baking appealed to him strongly. And the idea of using milk in abundance brought him quickly from the point that all bread ought to be 5 cents a loaf.

"I feel that you are stressing a valuable idea in working for the use of more milk in bread," Mr. Quick wrote in friendly fashion. "I would willingly pay more for better bread. A part of the trouble lies in the fact that modern milling takes out so many by-products that much of the best nutritional qualities of the wheat are removed to make a white flour, and they mix wheats so as to standardize it. **Many housewives used to use milk and butter-milk in their bread with fine results.**

"I hope your Institute of Baking may deserve and achieve all possible success. When there are plenty of the sort of bakers you are trying to turn out the quality of our bread ought to be improved, whether made co-operatively or not.

"My only contact with bread is in the eating thereof. It makes up a very large part of my diet. Evidently the new knowledge of baking has not reached Hagerstown, Martinsburg, Cumberland or Clear Spring, whence comes our supply. Our bakers' bread is bad stuff. The vast increase in the proportion of bakers' bread over home-made bread merely proves that women are ceasing to bake. We use bakers' bread most of the time, for all its inferiority."

There are many men like Mr. Quick who retain conceptions they obtained, perhaps, many years ago. Bakers' bread is changing in quality very rapidly. And Mr. Quick will surely contact, sooner or later, with a quality that will make him happy. Bakers who made the fight for quality know that they have won 45 per cent more people from home baking than the old time craft loaf did or could. And our graduates go out—over 100 a year—to push on up the Quality hill.

Chemistry's Frontier

DR. DAVID EDSALL, dean of the School of Public Health of Harvard

University, is author of a beautiful little brochure entitled "Chemistry Extending Its Frontier."

It starts with this quotation from the writings of Louis Pasteur:

"Take interest, I implore you, in those sacred dwellings which one designates by the expressive term: Laboratories. Demand that they be multiplied, that they be adorned. These are the temples of the future—temples of well being and happiness. There it is that humanity grows greater, stronger, better."

The American Institute of Baking maintains four laboratories given over entirely to such research work as is here looked forward to. It is interesting to know that the greatest of all Pasteur's discoveries, which brought on a new epoch in human life, was made through his observation of a bake-oven at work.

He had discovered that yeast leavened bread, and that if the dough were left too long without baking, it became sour. He had noticed, similarly, that yeast made wine and if it were left too long it soured, and became vinegar. He had noticed, also, that yeast made beer and that very often it turned bad after brewing.

"If the bake oven principle were applied to these," he argued, "maybe we could kill the yeast in wine and beer as it is killed in the dough by baking, and thereafter the alteration of these liquids will cease." He tried it—and it worked. Pasteurized milk is only an extension of the principle by which bacteria in milk are heated to their death point so that milk can be handled commercially without their turning it sour.

Having gone that far, Pasteur took the next great revolutionary step.

Observing mothers in a hospital dying from child-birth fever in great numbers, he conceived the idea that the surgeon's instruments and the nurses' bandages

might be germ covered, and so might be spreading the disease from patient to patient. He proposed **baking** the bandages and passing the instruments through a flame. And from this act by the great master developed the modern science of hospital sterilization, and sanitation to keep dust-borne bacteria under control.

On all sides may be seen the world's awakening to the fact that Pasteur "said something" when he gained, for the first time in the world, the right of a human being to speak from the laboratory, instead of by guess work and necromancy, about this world in which all of us are so mysteriously placed. The hundredth year after his birth finds more material being written about him than in all the 99 years preceding it.

What "Pie and—" Means

HAVE you noticed on any billboard in your town a new note in advertising foods such as jams, butter, honey, meat, eggs, and cheese? Manufacturers of all these products are catching up with the idea promulgated in the offices of the American Institute of Baking by John Burns, president of the Allied Trades. This idea was that "food should be advertised as it is eaten, not as it is manufactured."

Now comes the Simon Hubig Co. of Fort Worth, Texas, with a story of what "pie and—" could mean as a basis for co-operative advertising.

He took note of the products he manages to use in his pie business and how these might be advertised on the co-operative principle. In a letter to the Morton Salt Co. he had this to say about "pie and—" advertising:

"The plan of co-ordinated advertising of necessity breaks down the old method

of comparative advertising so often indulged in at the expense of other foods than the one advertised, and in advertising bread the advertiser of meat has simply strengthened his own selling argument. This method has gone a long ways towards eliminating what was formerly a very destructive force in advertising.

"The American Bakers Association instigated this move.

"As to pies in this general situation, when it is considered that one company alone baked 13,000,000 pies in 1923, it is easy to see the importance of this industry to the meat, fruit, butter, egg, mincemeat, raisin, lard and flour producers.

"Just by way of illustration we list herewith the consumption of the above products as shown by our records for 1923:

Lard	726,000 pounds
Flour	12,000 barrels
Sugar	2,000,000 pounds
Butter	65,000 pounds
Eggs	255,000 dozen
Fruits	40,000 cases
Mincemeats	150,000 pounds
Raisins	60,000 pounds

"The Simon Hubig Co., therefore, suggests that the producers of ingredients used in the baking of pies take into serious consideration the idea of following up their "bread and—" advertising by incorporating in their national advertising the idea of the wholesomeness of the ingredients of pie, using pies in connection with their illustrations, thereby increasing the sale of both pies and their own ingredients."

How has using **quality ingredients** worked out in this one company's story? It has grown from one small plant of a few years ago to a string of nine plants in Fort Worth, Dallas, San Antonio, Houston, New Orleans, Birmingham, Atlanta, Memphis, and Cincinnati, with four more plants about to be opened in Dayton, Columbus, Louisville, and Pittsburgh.

The Decreasing Use of Wheat

It Is Found to be as Great a Problem in New Zealand, England and Canada as in the United States

By L. A. RUMSEY

IN its effort to sell memberships at anything from \$1 to \$1,000 per person, the People's Legislative Service in Washington attributes all decline in the use of wheat in post-war America to the machinations of a wicked and overcharging "bread trust."

It praises, with an invidious finger of scorn pointed at America, the water loaf of England which is cheaper in price than the best-selling American loaf, but which has often been offered here without gaining any particular acceptance by the consuming public.

But what are those "who point with alarm" at American bread manufacturing conditions going to do about present conditions in England, in New Zealand, in Canada?

At this time there is a condition in the world's wheat market for them to take into account quite seriously. Dr. Rumsey of the American Institute has made a world-survey of complaints in each country, which shows America is by no means alone in facing the facts of wheat consumption's decline.

A great deal of the publicity concerning wheat and its products has been directed towards the decline in wheat consumption in the United States since the war. A proper perspective on the conditions which bring this about is apt to surprise us. As we look over the baking industry in other countries, we are amazed to find that our problem after all is not local; it is national, in fact, international in its scope. It is significant to find the same problem is of such importance that it oc-

cupies a leading position in the trade journals of three countries within the same month. It is still more important that the proposed remedial measures are almost identical, although they are arrived at independently in three different English-speaking countries.

Mr. James Tucker, in the March issue of the New Zealand Bakers' and Grocers' Review, uses actual production figures to show that there has been a drop of 21 per cent in bread eating for New Zealand from 1919 to 1923. These figures might almost be substituted with accuracy in the United States. In the one statement of the article which was italicized, we find the following: "**We are driven to the conclusion that the ignorance on the side of the public and keen competition of makers of other foods are the main reasons for the unfortunate drift of the trade.**" Has he by chance chosen the word which expresses with painful accuracy the American bakers' attitude towards his business? Have we considered it an unfortunate **drift** instead of fighting upstream against the rising current of food competition? Mr. Tucker has the courage of his convictions and boldly tells the members of his association what they must do to win back their rightful place in the production of a nation's food. His problem, its discussion, and the conclusions drawn might have been incorporated as a part of the article in March Baking Technology under the title, "To Increase the Use of Wheat," without changing in the least the importance of the situation or the meaning of the conclusions.

Canadians Concerned

A few days after the appearance of this article we find the Canadian bakers approaching the same question. A canvass of housewives in Toronto has furnished some figures that make it possible to get a true picture of the attitude of Canadian housewives towards the Canadian baker. And yet, the Canadians are eating just twice as much bread per capita as those in the United States. One hundred per cent of the homes in Toronto are using the product of the bakery. **Yet eighty per cent of these would be interested in learning of new uses for bread.** Fifty-six of the housewives called upon consider the quality of bread in buying. What an opportunity lies in this direction!

We have been studying carefully the influences which are steadily operating to cut down the percentage of wheat foods, especially bread, consumed in this country. Having made a survey of the factors and influences at work, we can then formulate plans to offset these conditions and inaugurate what action is needed to again increase our American bread consumption. Often the most difficult part of any investigation of conditions in a great industry is to collect the facts and formulate a conclusion which shall represent accurately a cross-section of the opinion as held by that industry. This was attempted in a limited way by the Wheat Council of the United States, and the results were more valuable than is usual with questionnaire methods. Six conditions or factors were presented as reasons for the decrease of bread consumption in the United States. One hundred and two representative bakers were willing to think seriously about the problem, answer the questions and express their opinions. These replies are worthy of careful study. Let us take them in their order:

An American Survey

The first question of general prosperity and its effect on the baking industry is perhaps the most general in its effects and therefore the hardest to analyze. A large majority of these bakers considered this factor to be important, while an equal number characterized it as very important. The question as stated was this: "High wage levels and an improved standard of living inevitably result in a tendency to abandon the simplicity, economy and wholesomeness of a diet based on wheat. This tendency is probably strongest in industrial communities. Is it important in yours? Are there any conditions which tend to offset it?"

This question of high wage levels was shown to be made up of a number of different situations as represented by the replies from different communities in thirty-six states. Bakers' opinions show that there are no distinct classes of people or occupations so far as their business is concerned, but that their customers cover the whole ascending scale of wage levels, with the so-called classes shading imperceptibly one into the other.

The following general classifications must be made. In those communities which are largely industrial the production of bread is very sensitive to any change of labor conditions. In those industries where labor is poorly paid, where the employment of day labor is subject to the demands of changing markets, the number of men out of employment can be estimated accurately from the drop in bread demand.

The next step in the scale of industrial workers, where comparatively high wages are paid and employment is steady, shows just the reverse. The condition is changed at that point where the salary begins to show a margin of safety above the actual necessities of life. High wages, good

conditions of living, and steady employment tend to develop a desire for luxurious foods in greater variety. Right here we can point to the greatest factor for decreased bread consumption in the United States. Any condition which tends to suddenly increase the cost of living for this class of workers, or temporary lack of employment, always means a reversion to the simpler forms of living. This simpler living, with food supplies of humbler origin, is a condition which has only been a few years in the background of that family's experience. It is at these times of compulsory economies that the people go back to their best and cheapest food, plenty of bread.

The Noon Luncheon

Another condition which is of utmost importance to the baker is the introduction of the noon lunch. This might be classed under "Changed Habits of Living," but it also belongs to this problem of wage levels. **The dinner pail and the package lunch prepared at home was a greater consumer of bread than any other food habit in the United States. This home prepared lunch has virtually disappeared. The industrial cafeteria and the lunchroom, with its offerings of a great variety of foods at moderate cost, has replaced the dinner bucket.** We may question, if we wish, whether these workers are better fed than they were when three or four bread sandwiches containing meats, eggs, jelly, butter, etc., supplied the energy for their afternoon's labors. Certain it is, however, that they will never go back again to the cold-dinner pail meal. We do know that the cafeteria or the restaurant is not selling to these customers a half pound of bread per person at each meal. Would the demand be greater if the quality of the bread and rolls in these restaurants were higher? At present there seem to be no conditions to offset this

tendency. In general, the wage level and improved standard of living has not so much affected the bread-eating habits of those people living in agricultural communities.

Fruits from All Countries

We often discuss the wide variety of new foods from which we can choose in preparing well-balanced meals to meet our changing tastes. In cities or in towns of any size there is no such thing as foods "in season." There is only one season—and that is the year round—for most fruits, green vegetables, and luxuries. The scientific development of the canning industry has given us a wide variety of any product, whether grown in our own garden or brought from the ends of the earth. But in the eyes of those men who devote their lives to the study of food values, of those whose work is to teach food values, these great numbers of available foods are **not** competitors of good bread, they are valuable accessories, associates, companions of bread on the table. The greater the variety of foods we eat, the more we must know about their relative values.

Is it possible to bring back the bread-eating habit in the face of this growing diversity of food supply? It has been done with milk; why not with bread, through similarly co-operative service? How we may proceed in such a task will be taken up next month.

(To be continued)

I enjoy reading in *Baking Technology* the story of the American Institute's growth. I wish you the greatest success in carrying out the splendid plans you have for improving bakeries, bakers, and as a natural consequence, the products of the bakery.

—S. H. Lawton, Delavan, Illinois.

WELCOME

OUR FRIENDS will be interested to know that a new bakery is opened in El Paso. Honest competition never hurt anybody nor any town. We understand that these folks know their business and that they bear a good reputation, and we, as we also try to serve the people of this city, believe their advent a healthy sign of the growth of this community when such people look upon us as a fit field for their location. We take this public opportunity to define our position of friendliness in legitimate competition because we, too, believe in our products and we know that the El Paso people will, in the end, be the real winners from better and better service which such competitive effort brings about. Our sincerity in this frank expression of welcome will be understood by all who know us.

PURITY

BAKING COMPANY

—From El Paso Times, sent in by former President Wm. H. Korn.

A REMARKABLE ADVERTISEMENT.

It is the "social conscience" as developed by Rotary, in action. How much more control this shows over the elemental lust for combativeness that lurks in human nature, than would a "growling" welcome to a new competitor! In this kind of leadership and welcome to competitors lies our industry's future.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

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We Work Together

***To win through quality production
and the utilization of scientific research
a welcome for two loaves of wheaten
bread for every one that now finds favor.***

Whip Sockets

IT IS said that the first fifty Packard automobiles were built with whip-sockets on the dash boards. It seems that the body builder could not conceive the idea of building anything in the way of a carriage body without a whip-socket. This is rather amusing to us today, in the face of multi-cylinder motors, four wheel brakes and the many other developments which have been brought forward in the automotive industry. We may laugh at that obsolete carriage builder, and yet his antiquated ideas, even if maintained to this date, would certainly be as progressive as those of the baker who attempts to operate a bakery without the advantages of scientific research and service as supplied by the American Institute of Baking and without recognition of the fact that a baker is after all a public servant with the direct responsibility of contributing to the economic welfare of the American people with a highly nutritive loaf of bread, manufactured and distributed by sound

methods. The American Bakers Association and the American Institute of Baking are performing an important work when they improve, or help to improve, the operation of any of these important functions. *Are you helping?*

RAYMOND K. STRITZINGER,

President.

Weight Enforcement

THAT much is to be desired in the methods of enforcement of standard weight legislation, every baker who has encountered such inspection methods is well aware. Bread taken at the oven is found to be legal, and the same bread picked up three or four days later, is found to have dried out until it is no longer legal. Any baker might be trapped in days of extremely dry, hot spells, and be well over the legal limit on cool, moist days.

Dr. H. E. Barnard proposes a means of substituting exact laboratory methods for the haphazard methods now in force. He has stated his method to the Indiana Conference of Weights and Measures Officials and they have received it favorably. If the baker gains the benefit of the newly proposed enforcement plan, he will only gain the rights that the meat merchandisers now enjoy. They are not accused of putting preservatives in meat from the appearance of the meat, but only when laboratory tests have shown preservatives to be present. Just so the speeding motorist is carefully "clocked" on an officer's well-tested speedometer before he is accused of exceeding the legal speed limit.

In another part of this magazine Dr. Barnard's proposal, with the resolution passed by the Weights and Measures officials after hearing it, is given in full. A study of it is suggested to all interested bread manufacturers.

At Atlantic City

IF BAKERS ever gain a national viewpoint on their product and learn how to work together nationally to "glorify wheaten foods" and gain a good name for them in every home, it will be because bakers come together in common conference to work out all problems that, if unsolved, might hold them apart in factions.

The next great convening of bakers will be at Atlantic City during the week of September 20. Atlantic City offers unrivalled entertainment facilities for wives of delegates who may care for the diversions of the ocean waves or the board walks while their husbands transact the business of their convention.

Therefore it is not too early to begin planning a trip to this convention as a summer excursion for the family; other plans can be laid aside without consideration if the Mrs. is informed immediately that she is to have a trip to Atlantic City in September. There are so many important problems facing the baking industry that no baker can serve himself well who lightly decides that he is not necessary to a successful convention. Success and numbers present are to be synonymous this year.

An Important Meeting

WHAT will the tenth annual meeting of the American Association of Cereal Chemists bring forth in the way of new light for the bakers of bread and the millers of wheat? The meeting is to be held in Minneapolis June 9-14.

It was not so long ago that a meeting of cereal chemists would be almost overlooked in the industry. Now certain flour mills are for sale under bank-foreclosure and it is noted, as the advertisements of sales appear, that the mills up on the auction block are not those who employed

cereal chemists to help make their product attractive when put into the final form of baked loaves.

One flour company just moves over to a point of additional recognition of the role of the chemist both in milling and baking. It puts in charge of an important department a man who is not only a cereal chemist of long experience but is in addition a baker of long experience in charge of bakery production under the most modern of plant conditions. The "baking test" has come into recognition as the final, vital test of flour values, just as the "feeding test" has come into recognition as the final measure of vitamin values in foods in general.

New Receiving Sets

Radio is giving America a new language. Already broadcasters are describing the eyes and teeth and facial beauty of singers who are about to intrigue the ears of listeners. This service counterbalances that of captions in the movies to show those viewing the screen drama what the actors are supposed to be saying.

These changes suggest the enormous task of the American baker to educate the public so that it can appreciate the revolutionary changes in baking methods now going on. When a housewife learns how the modern baker gives her a loaf rich in milk solids, in high grade shortenings that add nutritional value, and how he safeguards her loaf with sanitary conditions in the shop that were never before attempted, she will be his friend. Charges form a fine point of interest in which to advance the baker's case. Editors who attack in fairness must print the baker's reply, and every one of hundreds asked to do so this month and last month have responded splendidly.

Standard Bread Weight Laws

A Practical Method for their Enforcement Based on Recognition of the Legal Moisture Content

By DR. H. E. BARNARD*

Director, American Institute of Baking

Is it possible to take an important step in advance in the matter of enforcement by public officials of the standard weight laws governing bread weights? Dr. H. E. Barnard thinks it is. He proposed his plan, based on years of experience as a Weights and Measures official, and on an intimate knowledge of conditions under which a modern baked loaf is turned out by automatic machinery. He outlined his plan to an annual conference of Weights and Measures Officials, and they promptly considered it as a basis of studying its practicability for national adoption for all food products containing a variable amount of moisture. The plan is given in full below. It is commended to bakers for close study. Their opinions are solicited.

The plan is simply to determine the moisture-free weight of a loaf of bread and to add to this weight the legal moisture content. If the total equals the declared or standard weight the loaf is legal. The plan will take the guess-work out of weight law enforcement and is counted on to do away with disputes as to the elapsed time after baking of any sample taken for weighing tests.

THE American Institute of Baking, representing as it does, the scientific interests of the baking industry and having at heart the welfare of the baker in his every effort to produce the highest quality of baked goods for distribution under well regulated conditions, has given much thought to the subject of bread legislation. In common with all progressive bakers, the Institute takes no exception to the enactment of suitable regulatory legislation. It believes in rigid compliance with the laws, for it recognizes the right of the consumer to set up sanitary regulations to protect his health, pure food laws to insure the quality of the products he purchases and consumes, and weights and measures legislation in order that he may determine the quantity and value of such products. But, in order that commerce and industry may not be hampered by legislation, it is obvious that the laws and regulations under which

they operate must be reasonable and capable of enforcement.

In many states and in most large cities, laws, ordinances and regulations govern the sale of bread. The sanitary laws very properly set up the conditions under which bread may be manufactured. Such laws regulate the location of the shop, the care of machinery, the health of employes and the methods of wrapping, protecting and distributing. Other laws have to do with branding of bread and provide that trade names given to bakery products shall conform to the facts and formulas employed. In some states the name of the baker must appear on a sticker placed on the loaf or on the bread wrapper itself.

Perhaps the most important legislation affecting the sale of bread is the so-called standard bread weight legislation. The laws regulating the sale of bread by weight or by standard loaf vary somewhat in the several states and cities. In some states the baker is required to make loaves of certain definite size, of one

* In an address before the Annual Conference of Weights and Measures Officials, at Indianapolis, April 8, 1924.

pound, one and one-half pounds, as the case may be. A few states allow the manufacture of a smaller loaf of 12 ounces. Still other states authorize the manufacture of loaves of standard weight without any declaration of weight and further provide that loaves different in size from the standard loaves may be made if they are correctly marked with the weight of the loaf and the name of the manufacturer.

Most standard weight legislation provides certain tolerances on the declared or standard weight of the loaf. The subject of tolerances has been given serious consideration by all weights and measures officials and has been a subject of special study of the U. S. Bureau of Standards. It is obvious that the purpose of the tolerance is to protect the manufacture of unit package goods or unit products which, because of the mechanical processes employed, may vary somewhat from time to time.

The process of baking introduces additional sources of error because of the fact that oven temperatures are variable and the loss of moisture in baking is in a measure uncontrollable. Yet in spite of these errors in dividing the dough and in baking the loaf, the bread out of the oven in a modern shop shows a surprising uniformity in the weight of the unit loaves. But the fact that loaves may weigh 16 or 24 ounces out of the oven does not insure the consumer receiving a loaf of those weights. As a matter of fact, fresh baked bread loses weight very rapidly and a loaf which conforms to the legal requirements one hour out of the oven may lose so much moisture in the next few hours as to become short weight and so illegal.

If the loaf is newly baked, it is probably overweight and legal. If it is 24 hours old, it may be underweight and

illegal unless it has been wrapped shortly after removal from the oven in heavy airtight waxed paper, in which case it has lost little moisture and is still legal. But if the wrapper has been broken or removed, the loaf has lost weight and becomes illegal, unless the day is dull and humid, under which atmospheric conditions the loaf may gain weight and remain legal. But all of these conditions and variations, while of importance to the baker who wishes to comply with the law and of the inspector whose duty it is to enforce the regulations, is of no interest at all to the consumer, who gets the same amount of bread, no matter whether the loaf is fresh or stale, wrapped or unwrapped.

Determining Loaf's Value

The value of bread is determined by the character of the materials from which it is made and by the weight of the moisture free substance of the loaf. The weights and measures official has no concern with food values. His interest lies in determining how much food in terms of weight or volume is sold to the consumer. Since the mere weighing of a loaf of bread can never determine this fact unless the moisture content of the bread is known, it is apparent that officials cannot adequately protect the consumer by enforcing bread weight legislation of the type now on the statute books. This protection to which the consumer is entitled, and to which every baker will gladly conform, must rest upon a scientific basis which is uninfluenced by the length of time the bread has been out of the oven or by temperature and humidity conditions.

In beginning its work the Institute found that the usual method of determining moisture in bread did not give true values. Chemists used different methods for taking samples and deter-

mining moisture. Some authorities followed the practice of determining the moisture in a slice taken from the center of the loaf, others quartered the loaf and still others removed the crust and determined the moisture in the crumb. Some chemists determined the moisture in the sample by drying for a long period of time at a low temperature, others determined the moisture by absorption over acid, still others dried the sample in vacuo. Obviously such a variety of methods of sampling and analysis gave discordant and in most cases incorrect results, and because of this fact much of the published data on the subject of moisture in bread is of little or no value. In all of the work undertaken by the Institute the moisture was determined not on a portion of the loaf but on the entire loaf by air drying the sample and finally determining the moisture in an aliquot portion by drying to constant weight in vacuo.

Loss of Moisture

The following table shows the loss of moisture in commercial bread baked and analyzed at the Institute laboratories and exposed, unwrapped, to the usual temperature and humidity conditions of the room:

% Moisture 1 hr. after baking.	% Moisture 24 hrs. after baking.	% Loss 24 hrs.	% Moisture 48 hrs. after baking.	% Loss 48 hrs.	% Moisture 72 hrs. after baking.	% Loss 72 hrs.
36.16	30.34	5.82	26.56	9.60	23.31	12.85
36.16	29.61	6.55	25.45	10.71	22.66	13.50
36.16	27.63	8.53	22.51	13.65	19.22	16.94
36.16	29.10	7.06	24.54	11.62	22.26	13.90
36.16	29.36	6.80	24.22	11.94	21.53	14.61
36.16	29.09	7.07	26.03	10.13	19.19	16.97
36.25	28.67	7.58	25.00	11.25	21.75	14.50
36.25	29.04	7.21	24.53	11.72	21.88	14.37
36.25	29.50	6.75	24.39	11.86	20.92	15.33
36.25	29.23	7.02	25.19	11.06	21.99	14.26
36.25	29.40	6.85	25.43	10.82	22.75	13.50
36.60	29.40	7.20	25.37	11.23	21.56	15.04
36.18	29.35	6.83	24.87	11.31	21.73	14.45

Studies made of bread wrapped with different types of papers gave varying results. The following tables show the loss in moisture in the case of bread wrapped in different types of paper. The papers were waxed on both sides and were of the type known to the trade as self-sealing. Column 1 shows the weight of a ream of paper after waxing. It will be noted that bread wrapped in the lightest paper lost almost no weight during the first 24 hours.

Percentage Loss in Weight of Bread After Wrapping

Weight of	Wght. Bread 1 hr. after	Loss in	Loss in	Loss in
Paper	Baking	24 hrs.	48 hrs.	72 hrs.
30 lbs.	16.7 oz.	0.21	0.63	1.48
28 lbs.	17.4 oz.	0.61	1.63	2.64
28 lbs.	17.2 oz.	0.82	1.64	2.69
35 lbs.	17.0 oz.	0.41	0.41	0.83

It is obvious that the loss of moisture will be influenced materially by many factors, such, for instance, as the formula employed, the type of loaf, round top, split top, hearth, pullman loaf, etc., the character of the wrapping paper employed, the time of year with its varying temperature and humidity, the method of storage at the bakery during distribution, and in the grocery store or retail shop. The following tables show the moisture content and loss of moisture on a number of types of bread made from different formulas and recently studied at the American Institute of Baking.

The data included in the table was obtained from observation on fifteen loaves of each type of bread.

Special attention is drawn to the data showing the moisture content of bread made of the same materials but with a different absorption, that is, the amount of water used in the dough batch. It has been commonly thought that the baker is able to increase his yield of bread per barrel of flour by increasing the amount

of water used in making the dough. While the increase of water does give a larger yield of dough, a study of the weight of the bread as drawn from the oven and after cooling for a number of hours, shows very little increase in yield. It is apparent that the additional moisture content of the dough is baked out in the oven. It does not appear to be possible for the baker to produce a salable loaf of bread which contains any excess amount of water. A study of all the data at hand leads to the conclusion

actual weight of the dry bread or on the weight of the loaf corrected to a reasonable moisture content. Since, until recently, there has been no legal moisture content for bread, it has been impractical to employ this method of calculating the weight of the legal loaf, for it is obvious that to assume that the baked loaf should contain 30% or 40% of moisture would set up different standards for measuring its value.

When, however, the U. S. Department of Agriculture a year ago established

Loss in Weight of Different Types of Bread Made with Varying Amounts of Water.

Type of Bread	Absorption of Flour	Average Weight of Bread when baked	Average % loss 24 hrs.	Maximum % loss 24 hrs.	Minimum % loss 24 hrs.	Average ounces loss 24 hrs.	Maximum ounces loss 24 hrs.	Minimum ounces loss 24 hrs.
Round top	55%	1.5 lb.	5.26	5.79	4.70	1.26	1.39	1.13
Round top	56%	1.0 lb.	7.52	8.05	7.08	1.20	1.29	1.13
Round top	58%	1.0 lb.	7.05	7.67	6.30	1.13	1.23	1.01
Round top	60%	1.0 lb.	8.04	8.63	6.80	1.29	1.38	1.09
Round top	62%	1.0 lb.	8.23	9.09	7.00	1.32	1.45	1.12
Round top	65%	1.0 lb.	8.30	9.09	7.64	1.33	1.45	1.22
Round top	68%	1.0 lb.	9.22	9.90	8.44	1.48	1.58	1.35
Round top	61.6%	1.0 lb.	8.09	8.90	7.30	1.29	1.42	1.17
Round top	60%	1.0 lb.	7.51	7.88	7.08	1.20	1.26	1.13
Round top	60%	1.0 lb.	7.81	8.23	7.36	1.25	1.32	1.18
Hearth baked	59%	1.0 lb.	6.46	6.92	6.00	1.03	1.11	0.96
Split top	55%	1.0 lb.	7.61	8.26	7.37	1.22	1.32	1.18
Split top	58%	1.0 lb.	8.09	8.69	7.31	1.29	1.39	1.17
Split top	60%	1.0 lb.	8.00	8.80	7.36	1.28	1.41	1.18
Split top	62%	1.0 lb.	9.02	9.67	8.19	1.44	1.55	1.31
Split top	65%	1.0 lb.	9.56	9.88	8.60	1.53	1.58	1.38

that laws and regulations based upon the weight of the bread as drawn from the oven, six or twelve hours after removal from the oven, or when sold to the consumer, is unscientific and unenforceable except by arbitrary rulings, which have no part in the work of competent officials.

New Method Proposed

There is, however, a simple and accurate method of determining whether or not bread as offered for sale or when delivered at the home of the consumer conforms to the standard set by law or to the weight of the loaf as represented on the label. This method is based on

standards and definitions for bread and set up 38% as the moisture content of bread, it provided a means by which the weights and measures official may accurately determine the weight of the loaf when baked, no matter how long a time has elapsed since it was drawn from the oven or what the conditions have been under which it has been handled in the process of distribution. If we assume that a loaf of bread should contain 38% moisture, it is easily possible by determining the weight of the moisture in all substances in the loaf to calculate the weight of the fresh baked loaf. Assuming that the moisture content of freshly

baked bread is 38%, a one-pound loaf should weigh, when moisture free, a fraction under 10 ounces, to be exact, 9.92 ounces. If a loaf labeled "one pound" or sold as a standard one-pound unit weighs this amount, the loaf is legal no matter what its condition and weight when sold. If the dry bread is less than 9.92 ounces, the loaf, if sold as a pound weight, was underweight when baked and illegal.

Assurance for Consumer

By this method of determining the weight of the loaf when baked, it is possible for the inspector to insure to the consumer a definite amount of food substance. It is not necessary for the official to guess at the number of hours which overlaps since the loaf was baked, or to take into consideration the conditions under which the loaf has been handled, the humidity and temperature or any other factor which so materially influences bread weight. All the inspector needs is first, knowledge as to the weight of the loaf which is presumed to be sold the consumer, and second, the weight of the moisture-free bread. The first information he gets by reading the label or observing the size of the loaf. The second he obtains accurately by an analysis of the bread.

It will be urged that it is impractical to analyze bread in the enforcement of standard weight legislation. Such a claim is without basis, for the manufacturer is entitled always to the employment of methods of law enforcement which are free from personal error and, so far as possible, independent of the judgment of the official. There may be conditions under which the enforcement of law must be determined by official judgment. This is, however, not the case in well intended and well enforced legislation.

The official who is enforcing legislation

is entitled to instruments of precision and to laboratories in which they may be employed. Too often officials have in the past been appointed without regard to their expert knowledge. Men have become guardians of the standards of weights and measures who have only the slightest conception of the physical and mathematical sciences on which all standards of weights and measures must rest. If, in the enforcement of bread weight legislation, it were required of the inspector that he base his calculations of the weight of the loaf, not on the number of ounces the loaf shows when thrown on the scale, but rather on the number of ounces of moisture-free material in the loaf, it would be necessary to equip him with chemists and a chemical laboratory for the making of the test required.

To do this will dignify the work of the weights and measures official. It will place his work on a more scientific basis; it will, to a very considerable extent, remove it from the realms frequented by politicians rather than by scientists. Is it not possible to look forward to the day when all standard bread legislation will contain a paragraph requiring that 62% of the standard weight loaf or of the weight of the loaf indicated on the package shall be moisture-free solids? While this requirement is not found in any of the legislation now on the statute books or pending in legislative halls, it may well be made the basis for future bread weight legislation.

Conference Takes Action

As a means of bringing Dr. Barnard's suggestion to the food officials of the country and to the Federal government, the Conference passed this resolution:

WHEREAS: It has been alleged that in the enforcement of weights and measures legislation the only scientific method of arriving at the

actual weight of certain products with recognized properties of gaining and losing moisture is by determining the weight of the water free substance, and with basic data so obtained to calculate the original weight at time of production by adding thereto the legal or recognized moisture content.

BE IT RESOLVED: That this Conference of State, County and City Inspectors of Weights and Measures requests of the Bureau of Standards of the United States Department of Commerce certain data bearing on this subject as follows:

1. Is the method of calculating the weight of bread at the time of manufacture, or flour at the time of packing by determining the weight of moisture free substance and adding the legal or allowed moisture content scientifically correct?

2. Is it practical to suggest to Weights and Measures Departments that present methods of law enforcement be improved by providing that the actual weight of products at time of manufacture or packing may be calculated by adding to the moisture free content of the substance in question the legal or allowed moisture content?

3. Is it possible to devise methods for determining the moisture free content of bread, flour or other substances which may be used by Inspectors of Weights and Measures?

4. Is it advisable to work to the end that Inspectors of Weights and Measures be equipped with instruments of precision and with laboratories and departments in which they may be properly employed, to the end that Weights and Measure legislation may be based and enforced on true scientific principles?

Any baker who sees either merit or demerits in this plan is invited to send his views to the American Institute for correlation with all other opinions expressed in any part of the country.

Joy and Service

EACH in his own way, bakers in all parts of America rise to the public opportunities of the communities in which they dwell. They have traded their craft tasks within their bakeries to machines, and so have time to take their places among the important manufacturers of their neighborhoods.

In Mobile it is as organizer of clubs and civic bodies that Gordon Smith finds his congenial tasks in public service; in San Francisco women's clubs no longer revile bakers but send their committees to work out any problems that may arise in co-operation with R. J. Workman. He believes in the motto of winning through an investment of his time in public causes.

It is well known that Rembrandt, the famous painter, was a miller's son. Paul Schulze in Chicago developed a love for paintings and made a great collection of them, including many of the era of the miller's famous son. James Weber Linn, who writes a column called "Lights and Darks" in the Chicago Herald, tells with peculiar sympathy of the gift by Paul Schulze of five paintings as prizes to schools that do most towards raising a fund to purchase Stuart's portrait of George Washington.

"Mr. Schulze last year lent thirty large pictures, some of them of great distinction" writes Mr. Linn, "to one of Chicago's clubs. The club was not even asked to pay the insurance charges on the pictures. Mr. Schulze came once to see how they were hung and thereafter left them for six months, as he might leave a similar collection at the Art Institute." An unostentatious method of spreading contentment!

This was a fine prelude to a task to which Mayor Dever called Mr. Schulze as soon as it was seen that a public drive was necessary to bring the Stuart portrait of Washington to Chicago. Mayor Dever made this art-loving baker chairman of the general committee of citizens named to conduct the drive for funds. The drive is now going forward with marked success with contributions coming in by the thousands from school children and their mothers and grandmothers.

Quality in Bread

AMERICAN bakers are turning their attention to the nutritive value of their product partly, perhaps, because of the demand for a more nutritious loaf, and partly because the leaders in the baking industry have a vision of the service that they can render to mankind. They are using more and more milk in their bread. We consumers have a right to demand a more nutritious loaf, but we must be fair in our demands. We cannot expect the baker to neglect his own profits entirely for the benefit of mankind. If our demands are very great we must be willing to pay for them. We must not expect quality bread at the price of flour-water-and-yeast bread

It is gratifying for consumers to feel that not only bakers but others who are putting foods on the market are making a real endeavor to put as much nutritive value into the product as possible, and are employing scientists to study everything in connection with their product.

Some bakers are using buttermilk, others skim milk, others dried skim milk, and some even fresh whole milk, although the latter is too expensive to be profitable for some of them. The dried whole milk has been found to be adequate in all respects in which the fresh whole milk would be, as regards bread. The buttermilk and skimmed milk would be adequate except for Vitamin A, which would be supplied to most of us in the form of butter.

No claims are made for Vitamin C in bread. It is not found in wheat, and is found only to a small degree in milk. It is not sufficiently stable to withstand baking, anyhow. So, whatever kind of bread we use, it is necessary to supplement it with fresh, raw vegetables and fruits for our supply of this vitamin.

Yeast is a rich source of Vitamin B,

hence yeast breads are better than baking powder breads in this respect. Conclusions derived from experiments described in the *Journal of Home Economics* are: "That yeast bread made from whole wheat flour nourished albino rats more effectively than whole wheat flour leavened with baking powder, this being undoubtedly due to the increase of the water soluble vitamin from a low to an adequate level; that bread containing six cakes of yeast to a loaf turned out to be very palatable and nourished the rats much more effectively than bread made with one-half cake to the loaf. The extra yeast supplemented both the water-soluble vitamin and the protein."

I could not fittingly close this discussion without mention of the new things that are going on in the baking industry. As one scientist expressed it, "Things are happening by months, not by years."

—From an address by Helen Meston of the Wisconsin State Normal School, to teachers and parents interested in human nutrition.

Bread—and its Associates

HOW many foods can be advertised with bread to advantage? We have just seen some sheets from the Bakers Service Bureau, which this bureau recommends to its clients.

On each sheet is a series of five advertisements. The first advertisement tells the story of the cheese sandwich that "is splendid for a lunch basket." A combination of sliced bread and sliced cheese furnishes the illustration.

Bread and jam make up the picture for the second advertisement while the text tells how good bread and jam are "for that hungry after-school feeling." "Bread and Meat" are pictured together in the third advertisement—bread with a huge ham beside it waiting to be cut. "An

excellent lunch is bread and meat," the text runs, "for those who work hard and play hard." A bowl of milk in which broken bread is shown, is the illustration for the fourth picture. "Simple, wholesome, nutritious," says the text, "And Easy to Digest." Bread and Milk is a balanced ration, rich in energy.

Other combinations to which special advertisements are devoted are toast and eggs, toast and hashed beef, roast turkey with bread stuffing, French toast, soup with croutons served in it, nut and raisin bread sandwiches, bread and raisin puddings for desert, and bread spread with margarine.

From a Teacher

MAY I take this occasion to say that in my judgment your institution is pioneering in a field of education which is extremely important in an economic way. Having a little knowledge of chemistry, I believe there is much truth in the old adage "bread is the staff of life." In fact, I have in my possession charts which I have had classes in Food Chemistry prepare to show that one can secure more real nutritive food for ten cents when spent for bread than when spent for any other article of food.

Your work in showing the proper blending of flours, the correcting of mistakes, and overcoming difficulties when machines have broken down, is a great economic saving, and of much real value to every one who eats bread as well as to those who sell it. The work in your nutrition laboratory in my judgment is in every way a most desirable type of work, and is being well manned. In fact, the work of your Institute impressed me as being of real genuine service to both the makers and consumers of bread.

—J. A. Yates,

Head of the Chemical and Physical Science
Department, Kansas State Teachers' College.

At a Bakery

"Local Kiwanians And Their Wives Given Banquet at Hecht's Bakery," reads a headline in the Bristol Herald Courier, of Bristol, Tenn.

It was a real get-acquainted occasion, the report indicates. Men from every other industry in the city were there to see how the manager of a good bakery respects its business obligations. Mr. Hecht could venture thus to display his bakery, for he was one of the first class of students at the American Institute's School of Baking. And he knew just the relationship of every factor in his bakery to the best of modern standards. It is safe to say that no woman who was a guest of the baker with her Kiwanian husband will ever be told again to "please bake at home."

Iodine Bread Materials

Is the American Institute of Baking giving any attention to the possibility of incorporating iodine-bearing materials in bread, particularly in those regions known to be subject to goitre? It is a matter in which many health officials are becoming interested, and it seems to me there may be opportunities for constructive work along this line.

—From a letter of a well known
chemist and writer.

This letter brings a new suggestion to the baking industry. It may be worked out, as have so many ideas that seemed strange when first broached. Where fish are part of the diet it is known that goitre does not flourish. Some health authorities wish to introduce iodine into public drinking water reservoirs, as insurance against goitre in inland communities.

Cerelose in the Bakery

Recent Developments in the Production of High Purity Crystallized Dextrose from Corn Starch

ONE of the most interesting developments in the field of industrial sugar chemistry in recent years has been in the improvement of the process for the commercial production of a high purity crystallized dextrose from corn starch. Though various grades of dextrose or corn sugar have been on the market for many years, in solid "lump" or "chips" and a high purity dextrose is made on the laboratory scale, it is only within the last few years that the production of a white crystallized product in granular or powdered form has been commercially successful.

As a result of long continued chemical and technical research it is now possible to produce on the commercial scale a crystallized dextrose of an extremely high degree of purity. This product, which is made under the trade name of Cerelose at the Argo, Illinois, plant of the Corn Products Refining Co. of New York, has been the subject of considerable recent interest by food manufacturers and chemists as to its value and applications in various foods and pharmaceutical preparations.

Its use in breadmaking is of significant interest to the baker, particularly from the standpoint of a comparison of its effects with those of cane sugar or other fermentable carbohydrates used in bread formulas. The American Institute of Baking has received many inquiries regarding the composition and properties of Cerelose as a bread ingredient, and in order to obtain this information it is now conducting a series of investigations in cooperation with the manufacturers who have established a Research Fellowship at the Institute for this purpose.

1. Composition and Preparation of Cerelose

As previously stated, Cerelose is a white crystallized dextrose of high purity, in powdered or granular form, made from corn starch by acid conversion with subsequent crystallization, purification, and drying of the resulting product.

The corn starch used in the process is prepared with special attention to the removal of undesirable protein and its products, objectional water soluble compounds, and ash. The resulting starch liquor or milk is run into the converters at about 12.5° Bé, and hydrolysis effected in the presence of the required amount of chemically pure concentrated hydrochloric acid under proper conditions of pressure, temperature and time. The acid conversion is carried as far as possible so that the resulting acid liquor will contain over 90% of dextrose on the dry basis.

The acid dextrose containing liquor is then neutralized with sodium carbonate under controlled conditions to the required hydrogen ion concentration in terms of pH. This is determined colorimetrically by the use of appropriate indicators and solutions.

After neutralization the liquor is decolorized by passage through bone char filters. It is then sent to the vacuum pans for concentration to a syrup of the required density.

The next step in the process is the crystallization which is carried out in water jacketed crystallizing tanks which can be maintained at the proper temperature, fitted with an agitator or stirring arrangement. Proper control of the crystallization at this point is perhaps the most essential part of the process, as it is necessary to obtain crystallized dextrose of

uniform physical characteristics in order that the "mother liquor" or "hydrol" can be eliminated satisfactorily by subsequent centrifuging. Proper conditions of temperature and concentration are essential during crystallization, and in the past the successful production of a uniform sugar failed chiefly because of the lack of control of these factors.

After proper crystallization has been effected the crystals of dextrose are centrifuged and washed with water for the elimination of the "hydrol" and other impurities. Successive recrystallization of the mother liquor is carried out several times. The resulting "hydrol," containing considerable dextrose in solution, is used in "cattle foods."

The purified crystals after centrifuging and washing with water are then dried in a current of air in rotary dryers. Here also the maintenance of a carefully controlled temperature and air current is essential. Before drying, the crystallized dextrose contains about 14% water, which is present both in combination with the sugar and also as free moisture; 10% as water of crystallization, and 4% as free water.

On drying the free moisture is eliminated and a final product obtained, containing from 6 to 9% water of hydration. It is necessary to eliminate all free moisture to insure freedom from subsequent caking or lumping of the sugar. The resulting product is a white powder free from cakes or lumps, which is then weighed automatically in 100 pound lots and sacked.

Analysis of Cerelose

Samples of Cerelose have been examined in the Institute laboratories, and the following analysis is typical of the results obtained:

Moisture . . . 8.74% (Dried in vacuo at 70° C.)
Total Solids. 91.26%

100.00%

The total solids contained over 99.5% dextrose.

The total dextrin content is less than 0.05%.

Fermentation tests with bakers' yeast (Fleischmann's) indicate no appreciable non-fermentable sugar.

As a comparison, the following analysis of Cerelose has been recently received from a government laboratory*:

Moisture 8.73%
Apparent purity 100.02%
After removal by crystallization of 47%
of dextrose, apparent purity of the
mother liquor 100.2%
Error of measurement not greater than. 0.05%
If present at all, dextrin content is
probably less than. 0.03%
True dextrose purity between. . . 99.5% and 100%

Cerelose is thus a dextrose of high purity, with a moisture content of less than 9% and free from dextrin and unfermentable material.

C. B. MORISON,
Research Department
American Institute of Baking.
(To be continued)

Getting the News

Consolidated work for the whole baking industry can only be done from a central headquarters when all concerned understand motives, purposes and the direction of any given drive. Lack of contact means lack of confidence, and for that reason there is always a grateful feeling at the American Institute when any article in this magazine is copied, reprinted, or distributed by kind friends. It seeks to broadcast the news that all must have to keep in touch with the work that must be done together.

Five recent subscriptions indicate the wide-reach of interest in the American Institute. Two come from Australia, one from the Netherlands, one from New Zealand, and one from Holland.

* U. S. Bureau of Standards. (Communicated.)

Where Bakers' Raisins Grow

How California's Sunny Valleys Contribute their Bread Enriching Product to America

By DR. C. F. RUDMANN

Of the Research Department, American Institute of Baking

(Continued from the March number)

IN California newspapers these days one expects to find significant news of modern life. Two winters ago the Great West went bankrupt—in the area between the Sierras and the Rockies. Farmers walked off their farms, and the biggest intermountain corporation dealing in farm implements went bankrupt, after a record of not missing a dividend in forty years.

But in California the co-operatives saved the day. Egg producers, who so sold their Petaluma eggs that no buyer was ever “stung” by a layer of bad ones packed in with the good, reveled in a flow of money from New York, where their eggs commanded a margin of 10 cents a dozen above eggs from the Hudson River Valley itself—but packed to give “the rots and spots a ride.”

Similarly the growers of apples, apricots, oranges and lemons thrived on a merchandising system that never tried to fool a buyer and completely destroyed “Caveat Emptor” as a selling principle. Producers’ responsibility was fully accepted, just as it is by the sellers of quality bread and baked goods.

There is a thrilling story for every baker in this latest news item from Fresno. It is that J. S. Love returned to the Home of Raisins after a tour of America, and reported that American bakers were buying many more millions of pounds of raisins this year than in any year in American history. What’s behind that fact is the important thing for bakers. Raisin growers did not merely offer raisins to bakers and let it go at that. They

advertised raisins—not as raisins, but in the form **they expected people to eat them.** They spent over thirty times the entire budget of the American Institute of Baking just in advertising bakers’ raisin bread and bakers’ raisin pies and pastries.

Billboards told the story, as did pages of the national magazines. They ran out, thus, in front of the baking world with a story that pulled trade to the nearest bakeries. It was co-operation on a scale and of a size few industries have ever known. And did it pay?

As these words were written, a telephone request to Mr. Hassel of the Chicago offices of the Sunmaid Raisin Co. brought illuminating information. One small baker, who last year was able to sell enough raisin bread and pies to use up 238 cases of raisins, this year has already ordered 5,000 cases. Another baker has increased his order by 1,000,000 pounds. Another, who used last year 6,000 pounds, this year has already ordered 150,000 pounds.

The present writer first contacted with raisin merchandising when he visited a warehouse in the Bush Stores, New York. The warehouse was filled with hundreds of tons of raisins. Over them weevils were running until the raisins could hardly be seen for weevils. Every cluster was infected, apparently. In the writer’s presence a Health Department official condemned the whole lot to be taken to sea and dumped. All the raisin growers got was a Health Department condemnation certificate.

That was merchandising of the old style—shipments to commission merchants who worked for high margins and forgot about the **net result** to the growers. No wonder 20,000 tons was the total sales figure per year, instead of 238,000 tons now easily merchandised.

The raisin men have studied every problem of raisin merchandising as bread men must study every problem of bread and pastry merchandising and solve them. They found raisins kept better in the moist California climate, so this year they do not seek large orders. They seek to ship **fresh for immediate consumption**. So they ask jobbers to order only 30 days ahead and keep shipments moving. No more warehousing under improper conditions. That means ten times the sales this spring that are usually made in spring months, and it means to consumers of raisin bread and pies that they now find it more difficult to get a **bad** raisin on their dinner tables than it was formerly to get a **good** raisin on their dinner tables.

What if the bakers of America were so organized that it would be impossible for a bread consumer to get a **bad** loaf of bread anywhere from any baker? Would not that very fact shoot up bread sales the nation over as a similar fact has shot up raisin sales? There is an enormous lesson here for every industry still working on old lines—or on transitional lines as the baking industry is.

What if wheat men got behind wheat merchandising, and advertised wheat in the form it is eaten—as baked products? Instead, most rural papers are reviling the real merchandisers of wheat, and they were the worst offenders in maligning and misinterpreting and scandalizing the work of the Wheat Council of the United States. If the wheat farmers had known what every orange grower knows, and every Petaluma egg producer, and every

Wenatchee apple grower, the heroic efforts of the Wheat Council would have ended very differently from what they did.

It is pleasant in recording this one story of success, accomplished by bringing success to thousands of bakers as well, to record another fact: bakers want to know the story of what they use in bread, and will therefore gladly read this story of how raisins are grown in their own home valleys, and will remember it for use in talks to public societies where more and more the story of baking is being listened to. The story is continued from the March number.

The "Raysens of Corinth" was the title of the previous article discussing the history of the raisins of Europe. In a similar manner the following might be called "The Raisins of San Joaquin," for 95 per cent of our domestic raisins are produced in the California valley of that name.

Whoever has visited the Franciscan Missions along the coast south of San Francisco is not likely to forget about these pioneer missionaries who struggled north from old Mexico. This is especially true of those who have seen the very impressive "Mission Play" at San Gabriel depicting the early settlements in California and the important part played by the missionaries. We might easily conclude that these Spanish settlers of two hundred to three hundred years ago brought cuttings from old Spain, but this does not appear to be the case.

The raisin industry in California is but 70 years old. In 1851 Col. Agostin Harszthy grew Muscatels from the seeds of Malaga raisins and a year later imported some Muscats of Alexandria from Malga in Spain and planted them in the vineyard near San Diego.

In 1855 A. Delmas and G. Briggs also imported and planted some Muscat vines.

By this time (this was after the gold rush) the wine industry was quite important, and in 1861 Gov. Downey appointed three commissioners to work in the interest of the grape growers. Col. A——— H——— was one of these and was sent on an inspection trip to Europe. He did not seem to be a "real politician," however, and as a result of his efforts two hundred thousand cuttings and rooted vines were sent to California. Among these were the "Gordo Blanco," which gradually lost its separate identity and is now generally called a Muscat; the Sultana from Malaga and the white and red Corinth from Crimea.

These cuttings were the parents of the majority of the Muscats and Sultanas in California, although as late as 1876 W. S. Chapman imported Muscatels from Spain. It seems curious that the date for the debut of the first California raisin is an uncertain one, but such is the case. One reference states that in 1858 A. P. Smith of Sacramento produced true raisins from Muscat grapes, while other authorities give 1863 as the first authentic date. In this year Dr. J Strentzel had a display of cured raisins at the State Fair. Likewise, in 1863 R. J. Martinez had an exhibit of Muscat raisins and of dried grapes of four varieties to show the contrast between raisins and dried grapes.

Sugar Content Varies

Perhaps this will be a good time to say a word or so about grapes versus raisins. The Muscat is the chief seeded raisin with the Malagas and Feherzagoes produced to a small extent. Muscats are the big juicy raisins desired for pies and sold in clusters for the Xmas trade. They have more sugar than the Thompson and Sultana, which are seedless raisins, thus:

Seeded Muscat	76% sugar
Feherzagoes	80% sugar
Malaga	60-65% sugar
Thompson	65% sugar
Sultana	60% sugar

The first three may be bought with or without seeds, but the Thompson and Sultana are the seedless varieties.

In California the Sultana tends to have seeds and also more acid, giving it a more piquant flavor than the Thompson, so that the latter is more popular with growers. Prof. Bioletti of California considers the Thompson identical with the Sultanina of Asia Minor, so you will sometimes see that name instead of Thompson.

The present acreage planted in the different varieties is:

Muscats	113,497 Acres
Malagas	54,359 Acres
Thompsons	193,369 Acres
Sultanas	15,538 Acres
Feherzagoes	4,379 Acres
Currants	632 Acres

Grape and Raisin Differences

Now, as to some differences between raisins and grapes. First of all, the origin is different in that while there are perhaps thirty or forty species of grapes native to this country and Canada, the raisin grape is an article imported from Europe. Also the raisins are grown in level territory, as will be noted later, while many of our Eastern grapes are grown on the hillsides. California grows besides the raisin grape also wine and table grapes. The following figures of 1920 might be interesting.

	Acres	Non-bearing	Product Tons	Value
Table grapes.	64,923	15,938	160,000	\$12,000,000
Raisin grapes.	243,000	28,000	180,000	55,800,000
Wine grapes.	126,357	10,697	380,000	24,700,000

The wine grape has a high acid content and is very juicy, the juice of some varieties being highly colored. The table grape has a good flavor, medium sugar content, and a thick skin which enables it to withstand shipment. The raisin grape has a

very high sugar content, is thin skinned but yet is not a "slip-skin" like the Eastern grapes. Dried wine grapes would be unsatisfactory as raisins because of the poor acid flavor and the evaporation of the juice would leave little more than skin and seeds. Dried table grapes would have tough skins and a lack of sugar. Raisin grapes are not grown in the east for the reason that fogs and summer rains would prevent their being sun-cured into raisins.

First Successful Growers

The first successful California vineyards were those of G. Briggs in Solano County and of R. Blowers in Yolo County. They were selling raisins as early as 1867, but not to any great extent until 1873. That year they produced most of the 60 tons of raisins cured in the state. In the fall of the same year Muscats were first brought to the Fresno district where 25 acres of Muscats of Alexandria were planted in the Eisen vineyard.

The year 1873 also saw the introduction of raisins into Riverside by Judge North; into Orange County by MacPherson Bros., and into El Cojon valley in San Diego County by R. G. Clark. The southern counties rapidly increased the acreage devoted to raisins, but after a time changed over to the orange and citrus fruits, for which they were better adapted. The greatest gain was in the Fresno district, which as early as 1889 produced 50 per cent of the raisins in California.

Raisin Grapes in 1889

Fresno District	4,750 tons
Tulare County	150 tons
Kern County	40 tons
Yolo and Solano Counties....	1,200 tons
Scattering	250 tons
San Bernardino County.....	2,650 tons
Orange and Los Angeles Counties	80 tons
San Diego County.....	750 tons

Acres in Raisin Grapes 1923

San Joaquin County.....	407
Stanislaus County	9,638
Merced County	15,486
Madera County	23,358
Fresno County	207,147
Tulare County	73,284
Kings County	18,956
Kern County	16,236
Sacramento Valley	12,644
Southern California	4,618
Total	381,774

Fame of Northern Counties

In spite of the preeminence of the Fresno district at the present time, the northern district is famous for two reasons. First, the raisins of Yolo and Solano Counties are said to have been the first ones in the State to attract attention and the first to compete successfully with Spain. Second, the Thompson raisin has its origin in Sutter County. We have mentioned the Thompson raisin several times without discussing its history, so here is the story.

Wm. Thompson, Sr., happened to remember a type of seedless grape grown in England. It was a hothouse plant, however, and Thompson's idea was that the California climate would do the work of the English hothouse. He obtained in 1872 from Elwanger and Berry, Rochester, N. Y., three cuttings of the Constantinople grape called "Lady de Coverly." He grafted them on some old Muscat vines. The Sacramento River took part to the extent of washing away two of these vines leaving all responsibility for the reputation and care of "Lady de Coverly" to the one vine. Results with this vine were far from promising, or perhaps we might say "all promising," for practically no grapes were obtained. Thompson became discouraged and disgusted with results, other vines having been planted in the meantime, and he left them "go hang," which one of them

literally did, to a nearby tree. Having its own way, the vine produced fifty-six pounds of fruit, which was quite a reversal of form.

Nature's Way Wins

Thompson had no difficulty in convincing himself that his pruning methods had been faulty. He had been handling them like the Muscats and pruning back to three buds, whereas the Thompsons should be pruned "long." The new vines had not had a chance until they were neglected, whereupon they made evident the kind of treatment they needed.

First Car for the East

Considerable excitement and interest were aroused by the discovery, and there was a great demand for cuttings, and later for the raisins themselves after the first car was shipped East in 1893. The Muscats were being shipped at this time with seeds, the first packing plant to ship on commission having been built in 1890, and it was not until 1896 that a seeding plant was established. The first car load of seeded raisins was shipped to Minneapolis and was of the "Blue Ribbon" brand.

During these years the raisin production had been gradually increasing at this rate:

1873	60 tons
1875	110 tons
1880	750 tons
1885	4,700 tons
1889	10,000 tons
1900	47,000 tons

Imports Are Cut Down

In 1885 the United States imported 19,000 tons, so there was an appetite for more raisins, and at that time there was good profit for the growers, as they received about five cents per pound. But as the production increased to 15,000 and 20,000 tons there was a cry of overproduction. There was no organized effort at marketing nor any large demand for the

crops. There was no advertising, and raisins were thought of only as a holiday luxury. Dealers had the growers at their mercy, and prices gradually fell in 1897 to $\frac{3}{4}$ cents per pound, so that the growers were losing money and communities were rapidly becoming bankrupt.

In 1892 Theodore Kearney started the Raisin Association, which helped matters somewhat, but which was greatly handicapped by a lack of capital and by a continued increase in production. In 1903 the largest production so far—60,000 tons—was simply a case of too many raisins. The Association could not get rid of the crops it had contracted for, prices slacked off, and in 1904 the company went into the hands of a receiver.

The crop tonnage remained about the same for a number of years, as follows:

1900	47,000
1901	37,000
1902	54,000
1903	60,000
1904	40,000
1905	45,000
1906	50,000
1907	75,000
1908	65,000
1909	70,000
1910	62,500
1911	65,000
1912	95,000

Several unsuccessful cooperative attempts were made to stabilize the industry.

In 1910 "The Raisin Exchange" was formed to provide a central place for the buying and selling of raisins and to keep a record of sales and prices. About two thousand growers had signed up and although no actual operating work was done much valuable data was collected as to acreage and other pertinent figures. As a result of the various failures the idea had grown that an organization with cash capital was necessary to handle the finances and the so called "Million Dollar Company" was formed in 1912. It

was to have a million dollars capital to buy raisins without attempting to name a price or control the market. Subscriptions from the growers came in satisfactorily and as soon as the stock subscriptions totalled three quarters of a million dollars the "California Associated Raisin Co." was incorporated.

Under the direction of Wylie Griffin and others it grew rapidly, until at the present time there are 16,500 grower members compared to 6,500 members ten years ago.

(To be continued)

For the Ladies

A WOMAN'S love for cleanliness brings her more often to the loaf of bread she desires to buy than any other consideration. Successful bakers everywhere attest to their truth through the spotlessness of their plants. There is a little booklet—mostly composed of photographs—which any baker might send for if he is contemplating the telling of his story to his women customers. It is issued by the United States Bakery of Portland, Oregon, and seems to be the work of Englebert Franz, manager of the bakery. Besides an attractive cover there are nineteen photographs showing flour on its way through the bakery to the final form of wrapped loaves in delivery trucks.

Below the general view of the plant is this invitation to all users of the United States Bakery's bread, and all who may become its users: "Visitors are always welcome. It is a pleasure to show you through this institution, for we are proud of it. And don't tell us when you are coming. Just come any hour of the day. We never need to brush up for visitors, because cleanliness and sanitation are eternal with us."

A Retailers' Institute

From the Master Bakers' Association, in Chicago, comes the welcome news that its members have seen the need for an Institute to keep them informed of the latest advances in scientific knowledge. They have arranged for co-operation with the Siebel Institute of Technology to obtain a series of technical addresses at their monthly meetings and also for laboratory analysis of bread samples. These will be on the subject of bread and cake ingredients. Through George Chussler, secretary, the manufacturing retail bakers in this organization will seek to support the Siebel Institute's course in sweet goods and cake baking, as well as in general baking science. This course is now well established and its graduates are at work in all parts of the country.

An Advertisement

On the back page of a recent Saturday Evening Post was an advertisement picturing a loaf of bread made up into sandwiches. The sandwich loaf was so well made up that it forced even a seasoned baker to wish to lay down his oven peel and go searching out a sandwich lunch. It was a Washburn-Crosby advertisement and perhaps is the high peak of the thinking about bread occasioned by the rise of the Wheat Council and the Toast campaign. Many other advertising organizations are thinking about bread these days as they never have before. Some are in the service of bakers and some in the service of allied trades members. There is no telling to what new reaches of efficiency in advertising these agencies may reach. Never before was bread served as it is now by its friends who wish to see it merchandised to the best of advantage.

Books for the Baking Laboratory

THROW PHYSICS TO THE DOGS. By George and Alice Hayden. George H. Doran Co., New York City, N. Y. 80 pp. 1 fig.

Medicine is still far from being an exact science. There is no other explanation for the existence of the scores of cults, each of which is sure that its remedy is the only way of curing the ills of mankind. And so one school cures diseases by spinal adjustments, another by the administration of infinite dilutions of drugs, another by walking barefoot in the wet grass.

But George and Alice Hayden in "Throw Physics to the Dogs" give us still another infallible method by which, as they say, "Physic—may at least be eliminated from the family medicine chest." Their infallible road to health is based on a re-adjustment of the normal diet of man so that instead of being omnivorous, it approximates the herbivorous. And those who seek treatment must forget the pleasures of eating meat and milk, eggs, candy, tea and coffee. After having eliminated from the diet most of the things which make eating an enjoyable occasion rather than a perfunctory habit, the patient is told that the really important thing in foods is the cellulose it contains.

From the authors' viewpoint, cellulose "is more potent than physic." "In fact," say the authors, "it is because there is so small an amount of cellulose in the ordinary diet of today that we have become a race of constipated people; over eighty per cent of the people living in civilized communities having constipation in some form or other."

The millions of normal beings who make their breakfast combination of grapefruit with cereal or toast and coffee, will be dismayed to learn that this practice is "enough to make the most promising day end badly." Advocates of rye or whole wheat bread will be pleased with the suggestion that they should be substituted for what the authors describe as "the almost worthless white wheat bread."

After a discussion of constipation, the great modern plague, its effects on the health and methods to be employed in relieving it, a series of breakfast, dinner and luncheon menus is printed for the purpose, we must conclude, of assuring the reader that it is not necessary for him to confine his diet to grass, like Nebuchadnezzar. The menus are built around bran served

with cream and huckleberry sauce, with cereal coffee and soaked black figs. The dinner menus are even more interesting though hardly more filling than the breakfast menus. A typical one consists of melon, mushroom pie, carrots and peas, stewed tomatoes, celery, and baked banana and cream.

Of course, a book of this character is interesting reading to the neurotic types whose chief occupation is in studying their ailments and prescribing their own treatments. Some of the information will be helpful on occasion, but if the menus set up were generally followed human efficiency would diminish until it reached the vanishing point, and bran, now so profitably used in producing milk, would become as priceless as porter house steaks.

—H. E. B.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

The incidence of research on the baking industry Ellwood Hendrick. Chem. Met. Eng. 28, 718-9 (1923).

Physico-chemical properties of strong and weak flours. V. The identity of the gluten protein responsible for the changes in hydration capacity produced by acids. P. F. Sharp and R. A. Gortner. J. Phys. Chem. 27, 674-84, (1923): cf. C. A. 17, 3060.—Removal of soluble electrolytes of the original flour to the point where they exert little effect on imbibition produced by acids may be brought about by decantation, which is easier than, and as satisfactory as, centrifuging. Samples of flour were extracted first with water, then three times with 70% alcohol, once with 95% alcohol, and finally with ether. The protein removed by each of these solvents was determined ($N \times 5.7$). The residue was air dried, suspended in 100 c.c. of distilled water and the imbibition capacity of the protein determined with a MacMichael viscosimeter. The treatment with water removes much of the protein, and by comparing the amounts extracted by the water with those extractable with 70% alcohol, this was shown to be

gliadin. Most of the gliadin of the flour was extracted by water, while but little of the glutenin was so removed. The increase in viscosity of the residue suspensions from 40 MacMichael to 3650 M. on the addition of 0.1 c.c. N-lactic acid indicates that glutenin is the protein mainly responsible for the increase in imbibition when flour and water suspensions are acted upon by acids. The somewhat lower viscosity reading when lactic acids acts on the residue are attributed to denaturation of the glutenin by the 70% alcohol. A strong flour is apparently characterized by the presence of gluten possessing marked colloidal properties, whereas in the glutenin of a weak flour, the colloidal properties are much less pronounced.

C. J. V. P.

The value of calcium in the diet. Helen S. Mitchell. *Am. Food J.* 18, 463-5 (1923).—Need for Ca is demonstrated by feeding experiments on rats. Ca content of various foods tested with suggested menus to supply daily requirement of 15 grains are given.

H. A. Lepper.

Making a nutritionally balanced bread. C. O. Johns, A. J. Fink, D. B. Jones. The expts. upon which the claims stated in U. S. patent 1,356,988 were founded are described. A nutritionally balanced bread is prepared by supplementing the deficiencies of "patent" wheat flour with peanut or soy-bean flours.

H. A. Lepper.

Influence of starch on strength of wheat flour. J. H. Buchanan and G. G. Naudain. *Ind. Eng. Chem.* 15, 1050-1 (1923).—From results of baking tests and measurements of diameters of starch grains it is concluded that the size of starch grain affects the baking strength of flours, the stronger flours showing a greater proportion of smaller grains.

E. F. A.

Shortening, its definition and measurement. C. Davis. *Ind. Eng. Chem.* 15, 1089 (1923).—Reply. W. Platt, *Ibid* 1089 Polemical. Cf. C. A. 17, 1848.

E. J. C.

The chemical detection of corn flour in cakes and pastry. K. Fricke and O. Luning. *Z. Nahr. Genussm.* 45, 69-78 (1923).—The method for detecting corn flour in baked products proposed by Ottolenghi (*Z. Nahr. Genussm.* 8, 189 (1904)) is revised as follows:

To 50 gr. of the dried powdered sample add 100 c.c. of alcoholic potash (0.3% KOH in 80% EtOH). Heat with a reflux condenser on the water bath 1 hour and immediately filter through a folded filter into a 250 c.c. flask. Distil the EtOH until turbidity develops. Pour into about 1 liter cold water. Add 20 g. of alum and let stand 24 hours. Decant and collect the precipitate on an 8-cm. smooth filter. Washing is unnecessary. Mix the precipitate in a porcelain dish with 3 times its amount of sea sand and dry on the water bath. Finely powder and transfer to a long-necked flask with 10 c.c. of AmOH. Boil for 1 hour and filter while hot. When the filtrate is cold, add 3 volumes of benzene and a little kieselguhr. Filter after a few hours and wash free of AmOH with benzene. Treat the precipitate freed from benzene, in a small flask with 10 c.c. of aqua 3% KOH and filter. Add Esbach's reagent (10 g. of picric acid and 20 g. of citric acid in 1 liter of water) to the clear filtrate. Turbidity proves the presence of corn flour.

D. B. Dill.

Vitamins as medicine for children. E. Glanzmann. *Schweiz. Med. Wochschr.* 1922, 57-61, 84-9. *Physiol. Abstracts* 7,436. A review with bibliography.

H. G.

Patents

Bread-making. P. M. Travis and C. A. Glabau. *Brit.* 195,342, June 23, 1922. In bread-making, an emulsion, obtained by mixing H₂O, fat, sugar and powd. milk in an agitator, forcing through a homogenizer at high pressure and atomizing, is mixed with the flour, salt, yeast and additional H₂O. Mixing is effected at a temperature of about 120° F. and an atomizing pressure of from 800 to 3500 lbs. per sq. in. is employed. Malt ext. may be added to the emulsion, and fresh milk may replace the powdered milk, or the milk may be omitted. The whole or part of the sugar may be omitted from the emulsion and added later. Salt, being detrimental to the emulsion, is omitted. The emulsion may be dehydrated by spraying or other means, and the product used in powdered form. The emulsion may be used with wheat flour or any flour mixt. in roll or cake making. Suitable proportions of H₂O, powdered milk, sucrose, malt ext. and fat are mentioned.

Laboratory Tests for Truth

A BAKER, being offered coke for fuel, along with three different brands of coal, sent samples of all to the laboratories of the American Institute.

The results cancelled in his mind all "sales talks," and in a short time he had placed an order, entirely assured that he was obtaining the fuel with the largest number of heat units per dollar of purchasing price. This baker is not a "brand buyer" any more. He is a laboratory-test buyer, just as every large corporation is, and as every large city is in its public purchases. And as every baker might be, they all united in building up the American Institute until it reaches the full of its possibilities for service to all.

When the American Society of Bakery Engineers met at the Institute in March the first question that came up calling for a laboratory answer, was about fuels.

When was coke best? When was coal best? How fully could oil replace both?

Richard Wahl, president of the Society, told of the new methods of measurement by which heat units of fuel value in every kind of fuel could be accurately determined. He told of the movement, fostered by heating engineers, to have fuels measured and sold by their "B. T. U." content. He told how such a billing would reduce fuel prices to a common denominator through which all fuel buyers could find out from their bills how many heat units they were obtaining.

President Wahl proposed a plan that was immediately adopted by unanimous vote. It was that a survey be made of bakery fuels in all parts of America. The system decided upon was very simple. It was to ask each bakery production manager in America to send in a ten-pound sample of his fuel to the American Institute of Baking for analysis. When

the data have been compiled from this analysis bakers will know for the first time just how their favorite fuel compares with other fuels in the common scale of the British Thermal Unit.

William Luckow, chief of the Institute's analytical laboratory, was called in to tell how to prepare fuel samples for submission to the Institute's tests. The information he gave is reprinted here for the benefit of all who may care to submit fuel samples.

In order to get a fair sample, he said, the production manager must get some fuel from all parts of his car load or wagon load. Thus he should take a 5-pound shovelful, in the case of slack coal, or a 30-pound shovelful in the case of lump coal, from a dozen different points, as far apart as possible, in the coal supply. The gross sample thus obtained should be true to the run of the coal in the matter of proportion of lump, slack, and slate or other impurities. A sledge hammer or maul should then be brought into play on a smooth, dry floor. After the sample has been reduced to slack form and put in a cone-shaped pile, alternate shovelfuls should be taken as a reducing measure.

These shovelfuls should be spread out in two piles, one discarded and the other reduced by "quartering,"—taking two opposite quarters and forming a new pile from them until by that method a ten-pound sample results that will truly represent the total volume of coal. This should be put in a jar and sealed to prevent its gaining new moisture en route to the Institute.

With coke the same procedure should be followed. This survey, it is believed, will be only the first of many the Society of Bakery Engineers will conduct to find out the exact facts of bakery fuels.

AT

BAKING TECHNOLOGY

*A Journal of
Applied Science
in Baking*



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of Baking*

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No. 5

Pasteur at Our Institute

DURING Sep-
tember, in
about ten days be-
fore the 1924 conven-
tion of American
Bakers Association
opens at Atlantic
City, there will be at
our Institute exer-
cises of unveiling and
dedicating a bronze
bust of the greatest
man the modern
world has yet pro-
duced. On the occa-
sion of the hun-
dredth anniversary
of his birth, in De-
cember, 1922, scien-
tists from every part
of the world jour-
neyed to France to do honor to his
memory. In a voting contest the people
of France voted him to be a greater man
than Napoleon. In the baking industry
we can hail him as "the father of mod-

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ern baking," just as
in the medical world
they hail him as the
father of modern
medicine, and in the
dairy world they hail
him as the father of
modern dairying. He
suffered much in the
wars of his country,
and out of their tra-
vail he discovered
the way to save the
people from the
plagues that infest
the battlefield; he
even opened the re-
searches that ulti-
mately led to the
discovery, by one of
his students during

the World War, of a cure for the most
dreaded of all battlefield scourges—
gangrene.

A story as rich in romance as that which
most any industry could have connected

with it lies behind the bringing of this bronze bust of Louis Pasteur to the American Institute.

The bronze bust is a gift of two brothers, scientists and admirers of Pasteur, whose father learned forty years before the world in general woke up to the powerful prescription Pasteur had written for the modern world, just what his work was capable of.

Oddly enough, these two personal donors were once students in the very building where the bronze bust of the Father of Modern Baking is to repose after September 10. The story of the gift has its roots away back in the very beginnings of modern bacteriological science.

There were then many things, far separated in apparent cause, which swept through the world with devastating effect and held back the growth of the modern city, the modern industrial empire, and modern service to humanity.

The hospitals, for instance, were often styled "annexes to Death," so mysteriously did infections stalk through them after operations and in maternity cases.

In the fields great flocks of cattle died of a mysterious disease called anthrax. To be bitten by a mad dog meant sure death in the agonies of hydrophobia. A glass of aged wine was unknown, and it was the rule to drink beer within a week or two after brewing, because otherwise it was almost certain to spoil.

Aristotle's Overthrow

In the world was a mass of philosophy, based on the Greek philosopher, Aristotle, which accounted for most phenomena of life and death on the grounds of "spontaneous generation." Religious hierarchies preached that plagues were punishments of the Lord and were to be respected as such and suffered without protest or effort to thwart them. Many apparent miracles were heralded as from on high;

it was not even dreamed that they were only bacteria and yeast in action.

And into this moiling world, about 1866, came Louis Pasteur with a gleam of new light. It was the strongest gleam of light that ever shot from the mind of man across human events.

Miracles That Worked

"I am sending you," he wrote to a scoffer at his ideas, "three rabbits this morning. All will arrive well and happy on Sunday. On Monday they will die. The first will be dead of a fever similar to childbirth fever in our hospitals, the second from the fever that kills our cattle in the fields, and the third from the fever that kills our sheep."

Here was miracle working—the miracle working of the laboratory in action. Pasteur had discovered the germs of the fevers, he had studied their incubating period, he had inoculated his test animals, and he was able to take up the role of prophet, seer, and revelator with a sureness of vision no Delphic oracle or medicine man or pulpiteer had ever been able to even approximate. **His miracle came true.**

Principles of the Bake Oven

And how did Pasteur gain this hidden knowledge that made him the Father of Modern Medicine, although he was not a surgeon; the Father of Modern Baking, although he was not a baker; the Father of Modern Wine Culture, although he did not own a grape vine; the Father of Modern Cericulture, although he never owned a silk worm; the Father of Modern Dairying, when he had never owned a cow; the Father of the Science of Public Health, when he had never dealt with civic sanitation; the Father of the Science of Bacteriology, when he had only a shambles of a garret room in which to work out his world-changing bacteriological discoveries?

Used Microscope

The answer is very simple. Pasteur owned a microscope and discovered through ardent looking through it, the great world of Microscopia that had lived unknown and invisible to the masses of people, and had done daily combat with them for their daily food and for the very right to live.

The giant of Microscopia—the first of the microscopic creatures to yield its life story and allow its functions to be charted—was yeast, the same yeast that makes the baker's bread and the brewer's beer. And once Pasteur knew the nature of yeast he had opened a trail down which hosts of scientists in scores of institutes, such as the Rockefeller Institute, the Fleischmann Laboratories, the American Institute of Baking, the Cornell Bacteriological Laboratory, all are marching in an ardent love of science.

Father of Laboratories

Pasteur brought the laboratory into its own as a testing place for truth. Religionists fought him, superstitionists fought him, scientists fought him, and medical men fought him to a bitter standstill. And all were swept away to their ruin, so that he emerged triumphant 100 years after his birth as the great figure of the modern world. He gave men courage to fight back at environment in a field that had always brought them to their knees in fear before.

In the beginning he had a desire to teach France to make better beer than Germany, to punish Germany for Sedan. He failed in this, for the Germans learned his lessons quicker than the French. But like Columbus, who never found the India he sought, Pasteur pressed on until he had discovered a whole new world for mankind—the world of Microscopia.

"Your beer will turn putrid," he told a brewer soon after he had discovered that

yeast is the cause of fermentation and that there were seven or more different kinds of yeast, as well as other microscopic creatures, that could affect beer in different ways. One of these ways was that of putrefaction. Pasteur asserted to the brewer that the presence of one certain organism would always be followed by the result of its labors—putrefaction. To keep beer from spoiling, he urged, this one organism must be kept out of it. It bred in the air and might enter the beer with the brewery dust. **Therefore dust must go.** You hear that in every hospital nowadays. The vacuum-cleaner industry owes its opportunities to Pasteur.

But in a brewery he first announced the principle, and at once suggested that the medical world might well stop, look, and listen to his theory—the theory of the bacteriological origin of disease.

Jacobsen Takes Notice

He had noted how bread **does not** sour; how unbaked dough **does** sour. He discovered that the baking killed the yeast. Here was a principle capable of unlimited application. He would apply it in the hospitals. There they now bake the bandages and call it "sterilization." The baking kills the germs. Pasteur was first of all the world to suggest it, although the bake oven had put the principle to work in the case of dough for endless generations.

Now it happens that up in Copenhagen, while Pasteur was trying to teach the French about beer that if **pasteurized**, that is, if heated as bread is till the yeast is killed, it would remain good beer, a certain Danishman listened with intent ears.

This Dane was Captain Jacobsen, of the second generation of a family of brewers who had suffered much from ropy beer as bakers had from ropy bread. Jacobsen quickly applied the principles of Pasteur and conquered with them. He was the

first layman in all the world to bow low in respect before the LABORATORY. If Pasteur had found so much in a laboratory, through experiments, might not there be more to learn? He opened the Carlsberg Laboratories, now famous throughout the world. He found an obscure young chemist and installed him to work on yeast. This chemist is now world-famous as Hansen, father of "pure yeast cultures."

Honored at Carlsberg

Capt. Jacobsen had a portrait painted of Pasteur, and a bronze bust made of him by the sculptor, Paul Dubois, a gold medal winner at the Paris salon of 1876. Sorensen, famous scientist who will visit America in September, came along with many others into world fame for work in these Carlsberg laboratories.

To America came Dr. Max Henius and Dr. Robert Wahl, bringing the pure yeast cultures of Hansen. They built the Wahl-Henius Institute of Brewing to carry on with the Hansen method.

The Presentation

Presently there came to their school in America two young men of the Jacobsen family. They were Vagn and Helge, bearing stalwart Viking names. They studied in the building now owned by American Bakers Association—the American Institute of Baking. They returned to their country and gave much to the public parks, to research, to the collection of art treasures.

In a conversation last summer the appropriateness of having a bust of Pasteur at the American Institute of Baking, so that he might be honored as the father of modern baking, was discussed by Vagn and Helge Jacobsen. Their love of art and of their former school room was aroused. They arranged with the Pasteur family and the heirs of Dubois, the sculptor, to have a replica of the Carlsberg bust

of Pasteur cast in bronze and presented to the Institute.

Its reception will be the occasion of beautiful ceremonies, probably with singing by French and Danish singing societies, and an oration upon Pasteur's career by Dr. Sorensen of Copenhagen.

The detailed program will be published later. The occasion is counted on to bring many scientists to the Institute and to bring to America a piece of bronze which will enrich our country's art treasures.

Toast as a Food Jewel

CAN the serving of food be made a delight—a delight such as a beautiful jewel is—instead of just a "necessary function?" Mrs. Ida Bailey Allen tells how she saw it become so in a fine New York hotel. She tells how **toast** was effectively used in this service. The story is beautifully put together in a half-page newspaper advertisement of the United Bakeries.

"I sat at breakfast in a great hotel," writes Mrs. Allen, "and watched the men and women nearby. Coffee, fruit, and **toast** was invariably the breakfast order. There must be some specific reason why so many eat the same meal, I thought. Coffee for warmth and slight stimulation—fruit for refreshing, cleansing qualities—hot toast and butter because it tastes good, furnishes bulk, and harmonizes with other foods into a meal"

Advertisements like this ought to be read in every farm bureau meeting, and in every wheat farmer's home. If once he could see that bakers are the real merchandisers of his wheat—but then, that's another story. It's the story of those who tried to get America to eat up the wheat surplus and were ten times as much reviled as supported from the wheat farm regions.

Baking Bread at Home?

HOW much bread baking is being done at home? Editors cry for the woman to take up again her ancient drudgery, but these editors are mere men, and the women know better.

A representative of the Institute was asked to speak on the role of bread in nutrition before the Kenmore Neighborhood Association, in Chicago. A group of about forty women were present, most of whom were grandmothers. All knew the methods of home baking.

"Just now," said the Institute speaker, "there are charges of a bread trust because you are giving over home baking and calling at the grocer's for baker's bread. I think I can tell you why you did not do that before. The baker's loaf did not please you nor satisfy you. Now it does." A show of hands developed the fact that not a woman present was now a home baker.

The Institute speaker decided to venture another test. Naturally no man would admit that his wife was anything less than the best baker that ever lived. But here were women—they knew.

"I don't believe," said the Institute staff member, "that any housewife ever could or ever did bake bread such as she can now buy. I mean bread that was the same every batch, year in and year out, and was always good—never flat, sour, crumbly, heavy, or off in flavor.

"And this does not mean that the baker is more skillful than the housewife. The housewife never knew why her bread soured or got heavy. No baker ever knew, either, until yeast was intimately studied in the laboratory. Now we know that cold numbs it and it can't work at its best. So on a night a blizzard blew up, the housewife's bucket of dough by the kitchen stove became chilled and did not work up to its natural flavor. On

the night the hot summer wind blew with a parching breath the yeast became too warm to grow well, and the bread was "off" again.

"In the modern bakery protection to the dough is afforded that is impossible in any kitchen. The fermentation room is refrigerated against hot spells and heated against cold spells. The room is cork-insulated, with double windows and very strong, insulated walls. And it is equipped with moisture-spreading apparatus which turns itself on the moment the room becomes so dry a crust is liable to form on the dough. You home bakers all remember the slices that crumbled when touched with the butter knife. That was the dough crust translating itself into the bread grain."

The women listened to this narrative with applause and smiles. They knew the truth was being spoken, and did not hesitate to say so.

These women needed no more convincing proof that home-baking was well put away in favor of scientific bread manufacture. Something of the same spirit seems to actuate Carlotta C. Greer, head of the Department of Foods and Household Management, East Technical High School, Cleveland, Ohio.

Miss Greer writes to the Institute: "Since the activities of the home have changed so materially in the last few years, I am writing to ask what amount of bread-baking is done in the home as compared with the amount done in the commercial bakery."

Bakers who have noticed any remarkable shifts in their own neighborhood from home baking to dependence on bread manufacturers, would do us a favor if they wrote the story in to the Institute. It is always being called for by teachers and students of modern manners and ways.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

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MAY 15, 1924

We Work Together

***To win through quality production
and the utilization of scientific research
a welcome for two loaves of wheaten
bread for every one that now finds favor.***

Take Off the Brakes

MOST of us are familiar with the story of the engineer of an express train, all Pullman cars, who had been running his train for many years without accident or incident of note. On the occasion in question he had been supplied with a new fireman, and to add to his annoyance, it was a wet, foggy, slippery night. As the train went up a long, steep grade, it pulled very hard, so hard that he turned to the fireman and said, "Jimmie, I have never known this engine to pull so hard as she is pulling tonight, and I am scared, and I will be mighty glad when we get over the top."

Eventually the train pulled clear of the grade, and with a sigh of relief the engineer turned to his fireman and said, "Well, Jimmie, I am glad that hill is through with." Jimmie's reply was a classic. He simply said, "Well, I was scared too, but I wanted you to know I was helpin' you all I could, 'cause I had the brakes on all the way up to keep from slippin' back."

How are you helping American Bakers Association in its long, stiff pull? Are you one of the brakes, a passenger in one of the Pullman cars, or a real part of the power necessary to go over the top? Throw off the brakes, get in the game and see how quickly we reach our goal.

RAYMOND K. STRITZINGER,
President.

Bakers—Big and Small

IF it took the milk industry's members eight years to mill through the period in which every milk producer saw in his fellow milk producers only enemies and rivals he hated and feared, why should any worker in the baking industry feel downhearted because the same spirit has to be milled out of our ranks?

All around us we have industries whose members can point with pride to the day such animosities gave way to a spirit of co-operation. Just now we have before us a cartoon in a paper published for retail bakers. It urges them in accompanying text to beware of their "foes," the big wholesale bakers and the chain store bakers. It pictures them as trying to inveigle the retailer into a game which would prove his undoing. As we read this text and note the picture, we recall vividly an incident that recently occurred in Beaumont, Texas. There a baker named Schenck, president of the Texas Association, wanted to turn out a unanimous showing when the Texas convention was to be welcomed to his town. He did not want personal glory by overshadowing his fellows. He sought and won the support of every baker, wholesaler and retailer alike. And with them came the chain store baker. As all listened together to the stories of affairs that affect all members of the industry alike, they broke into simultaneous cheers for those struggling to handle such problems. And when it came time for local affairs to be mentioned, every

baker in Beaumont rose to count himself present, and to give his views on every local problem. Among them rose the chain store baker. Did he justify selling below cost to lure trade? Not much he didn't. He said such practices defeated themselves in the end and that he was no man to help hamstringing an industry for personal profit. He stated that he was selling every loaf of bread at a profit. We found his bread selling at the full price for bread in Beaumont.

Just as hate begets hate, and aloofness begets aloofness, and sharp practices beget sharp practices, so mutual confidence and fair dealing beget a harvest after their kind. President Schenck is of the type of man to whom the future belongs in our industry. He has done a tremendous service in pulling the Texas spirit forward on the road all must sooner or later travel.

Mr. Hoffman's Pride

OVER 150 retail bakers in St. Louis are going to receive an average of \$500 each in June—not as a free gift, but as a reward for careful buying and an exercise of the co-operative spirit, organized for action in their trade.

Elsewhere we print the story of how co-operation saved the raisin industry after the slump of 1920. This was co-operation practiced by raisin growers to market their whole crop, and it was possible because the crop was grown within narrow territorial limits. In Port Arthur, Texas, bread consumers of one of the big oil refineries receive their bread profits back at the end of each year in the form of dividends based on the amount of purchases. They operate a "consumers' co-operative" based on the famous Rochdale plan. There is still another form of co-operation, and this the St. Louis bakers practiced under the guidance of "Mike" Hoffman, proud manager of the co-operative, while the big dividend

about to be declared was piling up. The co-operative bought all things the member bakers needed, and at the end of each year returned the profits, as made on current price quotations, to its member stockholders. The fat surplus this year not only rewards Mr. Hoffman with joy, but it makes him feel that other cities could profit by what St. Louis has done. The money returned will make a big difference to many struggling bakers who have not gained much of a margin, other than this, through a difficult year.

Convention Time

SOME bakers believe that national conventions should be considered in the light of the need of bakers for a vacation period; that entertainment should be the one big feature of the program. Others believe conventions should be business meetings alone, with all entertainment cast aside as an unwelcome distraction from affairs in need of attention. Both views have been given ample elbow room at Atlantic City. The mornings will be for work; the afternoons and evenings for play and entertainment. Therefore everyone is assured of a successful time who marks the week of September 21 as National Convention Week, with Atlantic City as the objective to which all roads lead.

Getting Ahead

From appearances at convention time, George and Julius Schepps of Dallas, Texas, have nothing to do except to put pep into their state association programs. They were on that job three years ago, again two years ago, again last year. Now one hears, almost casually, that their one bread bakery in Dallas has a thriving branch in another city, with a cake plant in Dallas and a scientific laboratory as their latest industrial children. Has the convention work paid them? Write and see whence came the inspiration for their growth.

Bread Trust Nonsense

*English Loaf That Compares to American in Quality
Brings a Similar Price*

WHEN men who have never been in a bakery, start to write about bread they may go very much awry, especially if they have such a motive as Basil Manly did when he wrote for the People's Legislative Service, an organization for trumpeting the name of Senator LaFollette abroad through the land.

With a great show of hysterical assertion, Mr. Manly sought memberships for his People's Legislative Service by declaring that some kind of a crime was being committed because England sold bread at 5 cents a loaf made of American wheat, whereas Americans paid more at home. Also that New Orleans had cheaper bread than most American cities, hence all other bread prices must be wicked.

As it happened, a member of the Institute staff was in New Orleans shortly after these charges were made. He looked into the bread situation a bit. First of all he found the "pound" loaves Mr. Manly praised so extravagantly, were not pound loaves at all, but were scaled in the dough at from 14 to 16 ounces, and weighed when baked 12 to 14 ounces. No bread weight law down there. And not much need for the energy, either, which northern people like to get from their bread ration. A languid and music-loving population in the French, Spanish and Creole sections, know when the ovens bring forth their hot bread. They walk to the bakeries for this bread, for there is no pressure on them for time. They are the world's experts in serving gravies and sauces, and they put bread on the table as they do pepper and vinegar—as one of "the fixin's." They use it mostly as a sop for their rich gravies and omelette sauces. The bread is made of low

grade flour and yeast—nothing else—and becomes so dry after a few hours as to be almost unpalatable.

In that city the "pan bread," such as northern folks favor, sells at the same price as through the north. In the bakeries where it is produced, the cleaning gangs alone number more people than the whole personnel of the little family-unit bakeries where much of the French bread is turned out as cheaply as possible and is sold as cheaply as possible.

And thus the New Orleans vision evaporates under the eyes of anyone who will investigate and compare the facts with the Manly text.

England's Cream Loaf

And now comes England, doomed for the same crash. No comfort over there for the Manly charges. American wheat makes the bread that undersells the American price in England, does it? Well, the people over there are finding a better bread than the yeast-and-water loaf made of nondescript wheat. They call it the "cream loaf." And what does it bring per pound? The same 8 cents wholesale that is the prevailing American price.

And take it from the English bakers who have toured America, this loaf's English price "buys the baker twice as much as he can buy in America for the same money."

The cheapest loaf in England is never wrapped. The better "cream loaf"—almost identical with the prevailing American quality loaf—is wrapped.

And now note what Prof. William Jago has to say about English bread, in the light of the La Follette-Manly charges.

"When in America two years ago,"

writes Prof. Jago, "I came to the conclusion that with the English sovereign I could purchase on the average at least double the quantity of goods of almost every kind in England than I could in America. If this estimate holds good, then the American price of bread ought to be double that which holds good in England."

Money Worth More

"The great bulk of white bread on the English market is a perfectly plain bread made approximately according to the following general formula:

Flour 280 lbs.

Water 140 lbs.

Salt $3\frac{1}{2}$ lbs.

Yeast 2 lbs.

"The yield is 186 loaves of two pounds weight.

"The flour is usually 70 per cent straight run, mostly English milled from Manitoba, English and Plate's wheats. Comparatively little bread is wrapped, and none at the lower ranges of price. Most English bread shapes are very unsuited to wrapping purposes, and the loaves are irregular in shape and the favorite forms have a number of sharp cutting corners.

"At the old pre-war stable rate of exchange the English price works out at 4.25 cents per pound.

"There is a certain amount of trade done in this country with lines of bread which are known by such names as 'Cream Bread,' and others indicative of special quality. In one such case which comes within the writer's personal knowledge, the materials used are very fine flour, milk, butter, sugar, and other substances. This bread is baked in one pound loaves and sold at 4d. per loaf, say 8 cents American money. The bread is very similar in type and character to the usual better-quality American loaf."

Passing the Bread

A far cry from old days was the meeting of the City Federation of Women's Clubs recently held at Dallas, Texas. A beautiful lady dressed as a Dresden figurine appeared to entertain the ladies with the story of bread. She did it in charming fashion, but instead of telling the story of the bread that grandmother used to make she told the story of the rising confidence in bakers' bread until the world's most ancient craft had become one of its most important modern industries. The Dresden figurine was Miss Helen Horan of the Campbell-Stone Baking Co.

At the same meeting a beautiful pantomime was shown. It was called "The Family,"¹ and was posed by representatives of Schepps' bakery. The baking concerns did not impose an advertising feature. They furnished the Federation women with the bread, cake, and pies necessary for their entertainment and did it as a courteous measure of "getting acquainted." In at least one small town where the baking concerns are more backward no club woman would dare to offer her sisters bakers' bread.

The more we go into the matter the more clearly we see that preserves and jellies linked up with the Toast campaign adds more pep than any other food product in the campaign. You can say what you want to about the fancy dishes, but the masses cannot take time to serve the fancy dishes. Preserves on toast make a dainty dish, and it is a dish within the reach of all. For this reason we are working for your "Toast And" campaign whenever and wherever we can.

—G. A. Russell, the Bliss Syrup Refining Co.,
Kansas City, Mo.

The Work of Science

WHAT common interests have members of the National Academy of Sciences and bakers of bread? How can pure research invade the dough room? The answer is found in the newer knowledge of what science really is, how it is employed, to what end it labors. Vernon Kellogg, permanent Secretary of National Research Council, at the dedication at Washington of the building for the National Academy of Sciences and the National Research Council, interpreted the role of science in world progress and human betterment in these terms:

Science calls attention to its steady endeavor to satisfy the insistent demand of man to know the work he lives in, that he may more comfortably and confidently live in it; to know the wide reaches of the universe that his mind and soul may understand humility and yet know exaltation. Science moves with constant acceleration in its work of increasing human knowledge, adding to human capacity and expanding human existence. It asks to have recognized the many contributions it has made to the well-being and happiness of mankind.

By the very cumulation of knowledge more knowledge is made more rapidly possible. In the early days of prehistoric man before picture-making and writing, man could not cumulate knowledge or, at best, but slightly and slowly. But with the perfecting of means to communicate knowledge from one group to another and from one generation to another, the advance and cumulation of knowledge can and do proceed rapidly and ever more rapidly. In the present quarter century more knowledge of the order of Nature has been gained than in any quarter century before. One cannot dream too wildly of the possibilities of the future.

Let science, then, with all encourage-

ment, play undisturbed its glorious role of bettering the lot of individuals, adding to the resources of nations, and widening man's understanding of Nature and of himself. Let it go on in its great beneficences: conquering disease; ameliorating the wearing struggle for food and the cruel rigors of cold and heat; annihilating distance; reaping benefits from the oceans and forests, and bringing plants and animals to the service of man's sustenance and comfort. Let it continue to convert astrology into astronomy, alchemy into chemistry, guesswork into exact knowing. Let it use imagination to the limit—imagination is no less necessary to science than to the seven arts—but let its dreams be tested by the light of day. Let it prove all things, discover truth, and teach truth and the way of its discovery. Let it attend, undistractedly and unwearyingly, to its great effort to make our land a better land for our children and our children's children to live in, and the human future broader and better than the human present.

The Bread Family

"Bread and Its Humble Cousins" is the title of a very attractive little booklet issued by the Love Biscuit & Bread Co., of Honolulu. The booklet has been widely distributed in Hawaiiia, where bread "is now moving forward in the respect of the community."

G. S. McKenzie writes the Institute that two leading newspapers of Honolulu have devoted a special edition of their papers to telling the story of bread in connection with the opening of this company's new bread baking plant. This kind of work brings bread on a higher plane than that of its persistent detractors who are still operating in the psychology of twenty years ago, very often.

Chemistry's Advance

UNTIL the Moroccan troops of the French burst in disorder as poison gas poured down upon their lines, military leaders had not turned, as they have since, to the Scientist for much light on warfare. W. Lee Lewis' invention of Lewisite, a gas more deadly than any used in the World War, presages on what terms the next war will be fought out.

We of the baking industry know what enormous gains we have made by taking into account the work of the chemist and bacteriologist. Men who have helped this work go forward will appreciate a view of what Chemistry in general is doing for mankind, as given out by Harvard University.

"Napoleon was one of the first great national leaders to recognize the practical value of the Science of Chemistry," says this Harvard University brochure.

He assembled prominent chemists and urged them to produce synthetically the many necessary things unattainable in France cut off from the high seas in war. He, furthermore, even took with him on his campaigns scientists to supervise the chemical needs of the army.

Since 1800 the science of chemistry has risen to a commanding position in the thoughts and lives of men and nations. The history of the Science has been one of continual extension of its frontiers through countless developments of unending variety. The earth, with everything upon it, is composed of chemical elements. Upon the nature of these elements and their multifarious combinations we depend for the possibility of existence; without them, the universe, as we conceive it, would be void.

Chemistry possesses a fundamentality shared only by physics; together these branches of the great doctrine of matter

deal with the underlying structure of things. All our bodily life rests upon this foundation. Upon it all other sciences are built because they are concerned with occurrences in nature which are based upon the chemical elements and the chemical and physical laws governing these elements.

Appreciation of the fundamental nature of chemistry has been slow despite the fact that man has been forced to rely more and more upon chemical knowledge to meet the changing problem of his environment on earth.

Chemical discoveries mark the primary epochs in the history of human civilization and have been largely responsible for each great step in advance. Primeval man discovered and learned to use the chemical reaction called fire, and thereby he drew the first sharp line of demarcation between himself and the beasts. Later he discovered that by chemical reaction copper and tin could be produced from their ores. By use of this knowledge he laboriously provided himself with better tools. This initiated the Bronze Age.

Less than four thousand years ago man mastered a greater chemical process—the production of crude iron. This established the Iron Age, now developed into our Age of Steel. With better tools came better opportunities; simultaneously man's mental development increased and broadened.

The ancient Greek philosophers fondly hoped that they could solve all problems by abstract reasoning, but they utterly failed as regards the comprehension of chemical phenomena. The alchemists while appreciating the necessity of linking their thought with material things, sought unattainable ends through lack of understanding. They also failed. The physicians of six hundred years ago, although they saw that physiology and pathology are dependent upon the mate-

rial make-up of the human body, likewise failed in the application of their knowledge, because it was faulty and inadequate.

One of the first to appreciate the significance of natural science was Francis Bacon. Bacon's insight inspired Boyle and Boyle inspired Lavoisier and others. By the end of the eighteenth century chemistry began to receive consideration from many intelligent men.

History shows that as long as discovery was left to accident, chemical progress was very slow. It shows, furthermore, that eagerness and activity are not alone a sufficient qualification for fruitful discovery. Knowledge and imagination are essential. These bear their full fruit only when exercised by trained minds.

Modern medicine was revolutionized by Pasteur, the chemist, who brought chemical methods to the study of disease, and thus discovered the biological basis of infection. The antiseptics used in combating bacteria and the anaesthetics which make modern surgery possible are alike the products of the chemical laboratory. Countless essentially chemical products used to-day without any thought of the manner of their origin, safeguard our lives.

The human body is a chemical machine composed of twenty or more elements. It is driven by chemical energy from the slow combustion of compounds of carbon. Obviously a complete knowledge of the working of this machine in health and in disease is dependent ultimately upon the knowledge of its chemical reactions. The physiologist, anatomist, pathologist, bacteriologist, all have essential fields of work. Ultimately they all deal with chemical substances and chemical changes.

That medicine and public health are vitally dependent upon chemistry is attested by universal and individual ex-

perience. The progress made by medicine within the last few years—from the discovery of aspirin to the use of radium as a cure for cancer and the invention and use of "Baeyer 205," which, as a cure for African sleeping sickness, promises to make half a continent habitable—is largely due to progress in chemistry. According to Dr. David Edsall, Dean of the Harvard Medical School and of the School of Public Health, the continued advance of medicine depends on the advance of chemistry.

As the population of the world increases, the problems of agriculture must rise in importance, for upon the products of agriculture the life of man depends. Like medicine, agriculture rests on chemical reactions, for plants, like animals, are chemical machines. Their source of energy is primarily the photo-chemical energy of sunlight, which they store within themselves by means of chemical substances taken from their environment.

The fertility of the earth depends upon certain substances needful for growth but not always present in soil. Among these are phosphates, potash, and nitrogen in combined forms. The production and intelligent use of fertilizers have, therefore, a highly important bearing on the yield per acre. They must be employed more and more as population increases.

That industry is vitally interested in the Science of Chemistry is seen in the nature of industry itself. The function of a large part of American industry is either the conversion of natural resources into consumers' products, or the production of consumers' products synthetically. The sufficiency and adequacy of both of these functions have been and will continue to be dependent upon chemistry. Over \$60,000,000,000 is now invested in this country in industries more or less dependent upon chemical products.

Examples of the dependence of industry

on chemistry are seen in the development of the American dye industry; in the recent discovery of methods for extracting nitrogen from the air for use in fertilizers and in explosives, and in the manufacture of many products synthetically. Inexpensive soap is to be rated high among the assets of civilization; and so is cheap glass—for light is almost as desirable as cleanliness. The alkali industry, which made both of these happy consummations possible, is wholly a chemical one.

The twentieth century is the Age of Steel. The usefulness of this steel depends upon its chemical composition. This, in turn, is dependent upon the chemistry of its preparation and of its subsequent treatment. Small amounts of some impurities ruin the quality of steel. Other substances greatly increase its strength. The whole great steel industry of to-day and its adaptability to our needs, rest ultimately upon chemical preparation and analysis.

Since chemical laws and facts cannot be utilized until they have been discovered it is obvious that the debt of industry to research in pure science is incalculable. Pure science has supplied not only the great principles and laws, but also most of the separate facts upon which technical advance has been based.

In Pennsylvania

They have learned in Pennsylvania what cooperation and organization mean for the American Baking Industry, for there President Raymond K. Stritzinger tells the National story to his own friends and companions.

These bakers of one of the most stalwart of American states have determined that no man is fit to belong to a local association whose eyesight fails him when he comes to look at the work that only the National can do for him.

Their resolution, declaring a purpose to

do those things locally which pertain to their own locality, and to do those things nationally which pertain to the whole nation, reads thus:

Be it Resolved, That the Pennsylvania Bakers Association heartily indorses the splendid activities of American Bakers Association and directs its Executive Committee to enter into negotiations with the Board of Governors of American Bakers Association to the end that no man shall be a member of the Pennsylvania Bakers Association unless he is also a member of American Bakers Association.

The resolution further directed the Executive Committee to negotiate a system of paying dues by which a set sum could be divided between the local and the national associations, and the baker billed only once for all association dues.

Another Institute

Ontario, Canada, this year will open an Institute to train bakers, at the Ontario Agricultural College at Guelph in that province. The establishment of this college represents the fulfillment of years of effort on the part of Canadian bakers similar to the efforts that caused certain American bakers to be dubbed by our universities, "Professor of Pumpnickle," and "Doctor of Doughnuts." The Canadian association collected subscriptions to found this college for half a dozen years before the start could be made.

I find your magazine one of the most interesting technical magazines I have ever seen. As I am continually using such material for editorials and articles in HEALTH, and as I am beginning a series of syndicated health articles which go to 12,000 newspapers I will appreciate it if you can let me have this magazine regularly.

—Frederick R. Green, M. D., editor of Health.

The Retail Baker's Story

*How He can Tell it to the Public in an Attractive and
Inviting Way*

By ELMER L. CLINE*

Of the Taggart Baking Co., Indianapolis, Ind.

One of the inspiring workers in the bakery world is Elmer L. Cline of the Taggart Baking Co. He has tackled for years the problem of carrying the news of bakeries into the home. Advertising methods must change, he insists, with all other methods. The big winner of today is passé tomorrow. He suggests for the American Institute a Department of Advertising Research to rank with the research work in production. Between the baker and the home are, first, the baker's own salesmen, then the grocer and his salesmen. How shall the baker reach over past them to the consumer? Mr. Cline believes retailers must do it as much as wholesalers. He here tells how and why.

WHEN I was asked by your good secretary to talk to you, and he suggested the subject, "The Retail Baker Should Advertise," my first reaction was the question, "Why should the retail baker advertise?" The answer to this immediately suggests itself in a review of methods employed by other retail businesses. A retail baker should advertise for the same reasons the retail department store advertises; for the same reason the retail shoe merchant advertises; for the same reason the retail candy merchant advertises; for the same reason the wholesale baker advertises, and for the same reason the manufacturer of breakfast food advertises. Advertising has today become one of the principal factors for business success. It has contributed to the growth and development, not only of the manufacturer, the wholesaler, but more directly to the retail merchant than any other one thing in modern business merchandising.

Advertising is that force in modern merchandising that acquaints your market with what you have to sell; that educates your possible customers as to the merit of your product and its uses; that

builds up for you and your business a prestige, good will, and a reputation.

Like the automobile, the development of advertising and advertising methods during the past twenty years has been one of the great phenomena of business. No more adequately does the "benzine buggy" of a decade ago, with its patent leather dash-board and whip holder, express the luxurious touring cars of today, or the great commercial fleets that are moving our merchandise from coast to coast, than does the simple definition of advertising of the nineteenth century express the great business force advertising stands for today.

In Webster's Dictionary you will find this definition:

Advertise—To give notice or information; to give or make statements, requests, or the like, in printed announcements.

While, if you will turn to a more modern work, The New International Encyclopedia, you find under "Advertising," this:—

Advertising—The method by which the producer of commodities disseminates information regarding them.

The mediums for advertising are as follows: (1) the newspapers, magazines, and trade journals; (2) occasional literature, such as cata-

*In an address before the National Retail Bakers' Convention, at Louisville.

logues, booklets, circulars, almanacs, calendars, or handbills; (3) street advertising, including billboards, stereopticons, signs, and streetcars; (4) salesmen; and (5) personal advertising.

Advertising has become a real and recognized factor in business today. Advertising does not always make a business successful, but very few businesses succeed today without advertising. With the great development and growth of advertising, and its many ramifications, the question in your minds is not, should you advertise—of course you should—but the question is, “How should you advertise?”

This is a big question, for it covers a big subject. It requires, first, a knowledge of what is advertising. Too many people today still have in their minds the Noah Webster definition for advertising—accurate in his time, but by no means covering the subject today. To many people advertising is represented by these three mediums:—

1. Printed announcements appearing in newspapers or periodicals.
2. Painted signs and bill-boards.
3. Printed signs hanging in stores.

This conception of advertising is right as far as it goes, but it by no means covers the field of advertising endeavor today, for advertising has now become a phase of selling, a part of our merchandising effort, and must include, not only the mediums of advertising removed and apart from our direct merchandising processes, but must be considered with, and as a part of, our entire business that has to do with the marketing of our product. So, in the preliminary consideration of advertising we must not limit ourselves to:—

1. Printed announcements in newspapers and periodicals.
2. Painted signs and bill-boards.
3. Signs hanging in stores.

but must add:

4. Direct mail advertising, letters and handbills.
5. Educational advertising through schools and clubs by lectures, etc.
6. Window display advertising.
7. Appearance of store front.
8. Appearance of wagons and delivery trucks.
9. Arrangement and appearance of our store.
10. Display of product within the store.
11. Character and appearance of packages used.
12. Appearance and character of sales people.
13. Verbal advertising in store by sales people and employees.
14. Inner organization advertising to educate employees and through them correlate and develop all mediums of advertising being employed.

From this outline you will see that advertising is a big subject. It blankets practically the entire field of sales effort. With the exception of the great national advertisers, who, because of the wide and national distribution of their product, and their appeal to great masses of the country's population, have the means and facilities for advertising on the largest scale, the average advertiser cannot use to advantage all the kinds of advertising. This applies particularly to the retailer and to the retail baker. He must, as a student or advertising, lay before him the possibilities of this great selling force, and select those mediums and ways that are directly applicable to his local problems, and his local market. If he has not made a study of this subject, he can call in expert counsel, men who have made this business of advertising a profession, and who can, and will, advise him wisely what methods of advertising he can best use.

Every business has its limitations when it comes to advertising, and I often think of the quack doctor who lived in my city some years ago, and who, from a pecuniary standpoint at least, was successful. I will not vouch for his cures, but this particular doctor, while a quack, masqueraded as a legitimate member of the profes-

sion in that he followed the ethics of medicine by not using printed advertising. He was, however, an extensive advertiser, and the medium he employed was the personal impression he made upon the minds of the more or less unsophisticated laymen. The particular method this doctor had of advertising was to drive about the streets of the city in a very handsome Victoria carriage, behind a beautiful and well groomed team, with a liveried coachman on the box. As he drove over our principal streets and boulevards, arrayed in his high silk hat, he would bow and speak to everyone whose eye he could catch. He soon became a character in our city—a man who, to the thinking people, was an object of more or less ridicule, but to a great mass he was advertising, by his personal display and friendship, his business to the extent that he had a large following and made a fortune for himself.

I do not sight this as the best method of advertising, but to illustrate the possibilities of advertising, and how every man must analyze his business, know what his opportunities are, and apply that form of advertising which he can use to best advantage.

There are so many ways to advertise, and as each of them has brought success to someone, it is not practical to advise one how to advertise without an intimate knowledge of what is to be advertised, and to whom the advertising is to go.

I have thus far touched upon the subject of advertising in a general way to give you some idea of its scope and its possibilities, but as we today have the particular problem of the retail baker and his advertising before us, I believe there are some features that we can discuss to advantage, that apply directly to all retail bakers.

The retail baker's success is measured by his ability to hold the patronage of a restricted locality. If a retail baker fails

to get his share of the patronage in the district immediately surrounding his bakery he fails completely; if a wholesale baker loses out in this particular neighborhood, because of the large area he covers, he still has the other 80 or 90% of the city's market in which to make up his loss.

The local baker's success then depends in a very large measure upon the extent to which his market knows him. There is really no excuse for any retail baker not taking the pains to know his market to the last degree of completeness. He operates in a small area by comparison with the wholesaler and jobber. He is in almost daily contact or easy reach of his customers, and his possible customers. The knowledge he seeks will not come from casual talks with his friends, or necessarily from watching the people who come into his store. It is the people who do not come into his store that he needs to know the most about, and this kind of information can only be secured by going out after it.

If he is located in a marketing district, such as we find in most of our larger cities, business centers where people come to do their shopping and marketing, from the neighborhood within a radius of eight or ten blocks, many people pass his store front who do not trade with him, yet who are all possible customers. The appearance and attractiveness of his store is therefore of first importance in attracting attention to his business.

A periodical house canvass conducted by himself, or his clerks, I venture, will be found more profitable than spending all his time behind the counter or in the bake shop. The thing he wants to do is to find out how many people in his neighborhood do not trade with him, and why they do not trade with him, and a canvass of this character will be most illuminating.

As a guide for such a canvass, here are

some of the things you should know about your market and your business.

1. From what section, and from what class of people do you attract your patronage?
2. What do the people think of your store, your prices, your service, and the courtesy of your sales people?
3. What character of goods is it you make that is attracting people to your store? What are they going elsewhere to buy?
4. Is the display of your goods as inviting, and makes buying as easy, as those of your competitors?
5. What other lines are there you can add to your store to meet the requirements of your neighborhood?
6. Do your windows make as good impression as those of your competitors?
7. How many people are "knocking" your store because of some misunderstanding?
8. How many people are "boosting" your store, and why are they boosters?
9. What kind of advertising are the people in your neighborhood responsive to?
10. Is a neighborhood paper published in your district, or church or Lodge papers?
11. Do the people in your neighborhood notice window displays?
12. With how many people is your store the first choice—the place where they begin their shopping?
13. With how many is it second choice, or last resort—and why?

The retail baker who knows such facts as these is well on his way to give his market the consideration and service it wants. He will find, with such information as this at hand, the ways and means of advertising will unfold themselves and offer, not a difficult problem as is now thought by many, but one that follows in a logical manner.

You will find, as I know it has been found by some retail bakers, after such market analysis as has been suggested above, that the best ways to advertise for the retail baker, aside from having quality products—this we take for granted—is to begin with the inside of your store; **get the right kind of fixtures, display your goods well so they are easy to buy.** Train your sales people to be courteous and

pleasant. Train them to not only be satisfied with the sale of the goods the trade asks for, but by word of mouth advertising to suggest, and develop through suggestion, the sale of the many other items you have in stock. Look well to your front window display.

It is not enough to have your goods always on display in your window, but take a lesson from the great retail merchandisers, such as Marshall Field, John Wanamaker, or any of the large and progressive retail department stores—put variety in your window displays. **People grow tired of seeing the same old things.** It is not necessary to always show your goods, and sell out of the window. Use your window to tell a story or create an impression about your business. Window displays in a retail bakery should be completely changed in character and style at least once every week, and preferably every day have something new to show and tell your customers through this powerful medium of advertising.

Make the outside appearance of your store attractive. Keep it painted up. Here is where the impression is made upon many of your prospective customers who are daily passing your store, but are not now coming in to buy. Perhaps their only idea of your business is what they see as they pass by your store front.

Have your delivery automobiles and equipment of the same character you boast for your products. These vehicles are seen by many people who are not now buying from you, and who perhaps do not even pass your store front. The bakery delivery equipment is one of the most important phases of bakery advertising, and, I regret to say, one of the most neglected.

Definitely lay out the territory you consider your market, and at regular intervals see that every home in this district receives a message from you. This can be in the form of advertising in sectional

papers, through letters or circulars, or even handbills, but tell your market what you have to offer them, and what your store stands for. Invite them to your store, and when they come in, make good on all your statements by making their visit with you profitable and pleasant from the point of service rendered.

Take advantage of seasonable opportunities, special sales, and special service. There is scarcely a week goes by that we do not receive some calls from some part of our city asking us if we make wedding cakes. Some retail bakers in our city are certainly passing up a wonderful opportunity to render service to their neighborhood in this particular line.

The ways to advertise are almost innumerable, but it has been my experience that the difficulty with many advertisers is that they do not appreciate that advertising is a part of selling, and that advertising is not a mysterious "something" they know nothing about, but others seem to, which if they could but discover, would work magic to their business. Advertising is a knowledge of facts, and a plain, simple, sane application of greater sales effort and wider dissemination of these same facts as applied to your business. Your market is like a safe—perhaps you can force the lock, but it is easier to work the combination. Business is constantly changing like base ball, the hits you made yesterday, or the things that won business ten years ago, will not win the game today.

I was very much impressed with the remarks of Chauncey M. Depew on the occasion of the annual birthday dinner tendered him by the Montauk Club of Brooklyn, when he summed up his philosophy in these words:—

"I have no fears for the present or the future," he said. "On the contrary I believe that the next ninety years will experience a peace among nations, a mutual helpfulness, a revival of in-

dustry and international commerce beyond anything known in the past.

"I am not disturbed by the religious excitement or controversy which is shaking the land. It all leads to discussion, discussion leads to light, and light leads to truth. Publicity is the solvent of most ills."

Here is a man, who, after ninety years of living full of successful business enterprise, sums up the experience of this successful period with the words that, "discussion leads to light, and light leads to the truth. Publicity is the solvent of most ills."

In closing, I know of no better recommendation that I can make to the retail bakers than that suggested by the remarks of Mr. Depew. If you will study your business more thoroughly, read everything you can about the baking business, and the best text books I know of are the trade journals. **If every retail baker will subscribe to the trade journals, and the baking industry is fortunate in having a number of good ones, they will find ideas, suggestions, and information that, if applied to their business, will not only solve most of their troubles, but will keep them in time with the times, posted on the new thought, new ideas of this great industry, and by more thinking, more discussion, and greater application, the retail baker's business will continue to grow.**

From the American Institute we receive much data that is a useful source of information in our food chemistry and nutrition classes.

— Stuart B. Foster, State Normal School,
Framingham Center, Mass.

I again want to compliment you on your wonderful School of Baking. I certainly wish it were possible for every baker in the United States to, at some time or other, go through it.

Russel L. White, City Baking Company,
Indianapolis, Ind.

EXAMPLES OF BAKERY COSTS AND PROFITS IN 1923

As prepared for Baking Technology from nine bakeries, each using less than 25,000 barrels of flour per year, by John C. McAlpin, member American Institute of Accountants, of 1411 Walnut Street, Philadelphia, Pa.

No interest on investment taken. All depreciation in one item. No income tax included.

Computed on Basis of Bbls. of Flour Used	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9
Flour Used Bbls. 1923.....	7,150	6,742	24,916	16,194	20,660	25,022	7,976	4,381	13,992
Costs:									
Flour	\$ 6.81	\$ 6.74	\$ 6.81	\$ 6.60	\$ 6.47	\$ 6.47	\$ 6.64	\$ 6.42	\$ 6.75
Other Materials	2.87	2.74	2.42	2.36	3.10	2.84	1.98	2.74	2.92
Bakers Wages	1.35	1.63	1.51	1.47	1.60	1.78	1.42	1.96	1.72
Operating, Repairs, Fuel, Light and Power .....	.88	.89	1.25	.62	1.93	1.27	.96	1.40	1.06
Wrapping and Packing .....	.44	.66	.63	1.01	.74	1.04	.68	.74	.77
Horse, Wagon and Auto Exp. ....	.72	1.71	.76	1.18	1.46	.42	1.11	1.86	1.42
Drivers and Route Men.....	1.20	1.60	.87	.91	1.66	.59	1.96	1.43	1.63
Delivery and Shipping .....	.67	.61	.76	.28	.33	1.35	.17	.47	1.0
Advertising .....	.18	.18	.52	.17	.15	.41	.09	.45	.10
Managers .....	.43	.77	.91	1.61	.71	.72	1.06	.97	.54
Office Expenses .....	.61	.51	.61	.19	.59	.28	.29	.24	.21
Interest, Taxes and Insurance.....	.25	.27	.20	.26	.49	.38	.53	.38	.35
Bad Debts .....	.....	....	.07	.14	.....	.04	.03	.02	.03
Depreciation (all Departments).....	.63	.71	.42	.43	.89	.74	1.50	1.54	1.15
Total Cost	\$16.44	\$19.02	\$17.74	\$17.23	\$20.12	\$17.43	\$18.76	\$20.53	\$18.88
Profit per Bbl.....	2.63	1.58	1.45	.95	1.55	1.88	1.63	.16	1.03
Selling Price per Bbl.....	\$19.07	\$20.60	\$19.19	\$18.18	\$21.67	\$19.31	\$20.39	\$20.69	\$19.91

COSTS ON PERCENTAGE OF SALES

[illegible]

More Milk for Better Bread

An Analysis of Formulas in One Hundred Bakeries Shows All But Twelve Regularly Use Milk

By H. WILLIAM WALKER

Of the Dry Milk Co., New York City

IN no untimely way are bakers turning to the greater use of milk in bread. At Columbia University nutrition experts found milk bread to be such a fine source of food of supernutritional merit that they have started a campaign to increase its use. They do this for the sake of city people—not for the benefit of bakers. A Department of Agriculture expert just arrived at the American Institute to tell of his department's hope and wish that bakers may make a much greater use of milk in bread. He was startled when Mr. Hall took from the records of the Service Department 100 formula cards, chosen at random from those on file.

These 100 cards represented the baking practices of bakers in 35 states, and in Nova Scotia. Of the 100 bakers, 33 were found to be using sweetened condensed milk, 43 powdered dry milk, 12 whole milk, and 12 were not using milk at all.

The government representative was startled at the showing, and was equally startled at receiving the scores of articles sent out by the Institute advocating the use of milk. He said he had come to preach and convert, but that he was going back to report enormous progress in the direction he would have the industry go.

From many angles come new evidences that the industry as a whole values the use of milk, for almost every convention this year has included on its program a talk on the use of milk in bread.

From these, as giving still another angle on the problem, we print here a paper read at the Texas convention by Jos. Brown, southern manager of the Dry Milk

Co., of New York. It was prepared by H. William Walker of that company, and gives the view of a practical man on milk in bake shop products.

MILK, from a nutritional as well as from many other standpoints, is one of the most important ingredients in bread. It is one of the oldest forms of food known and its incorporation into a dough in generous amounts, greatly assists in the production of a finished loaf of high nutritive value with an appetizing appearance and flavor.

In regard to the form of milk to be used, the baker has a comparatively wide range from which to choose. Milk, in some form or other, has been known since the dawn of civilization, but the baker of today finds four distinct forms of milk on the market—liquid, evaporated, condensed and dry. I wish to call attention to the advantages to be found in the use of dry milk in the bake shop, as this is the most modern form of milk, and, therefore, the one with which bakers are in all probability the least familiar.

A baker should consider any food product from three points: First, the characteristics of the product itself which make it convenient and economical to transport, store and use; second, ease with which it can be used in the dough and results obtained with it; third, its cost.

One of the first points which I wish to emphasize is that dry milk is not a substitute, but is just the clean, wholesome, nourishing solids of milk, minus the 87 per cent of water that constitutes the

greater part of the milk as it comes from the cow.

The liberal use of dry milk in bread increases the nutritive value, improves the flavor, texture and keeping qualities of the finished loaf. It also imparts a true milk flavor to your bread.

With the increasing amount of information relative to nutrition that is being constantly offered to the general public, a keen interest in such matters has been aroused in the minds of the American people. The American public is being daily informed of the importance of a plentiful supply of milk in their daily diet. Bread is an article of food which appears on the table at every meal in homes of all classes, rich and poor, and it is quite natural that nutritional investigators have been interested in determining the actual nutritive value of breads of different kinds. **Long series of feeding tests have been conducted, which have unquestionably proven that bread made with milk has a superior nutritive value to bread made without milk.**

The time has passed when a baker who wishes to be successful can allow himself to figure on how cheaply he can produce his bread; quality and nutritive value **must** be his keynotes. This fact is becoming universally recognized, and the bakers' sincere efforts to produce a loaf of bread of high quality and nutritive value which will fully equal or surpass that made in the home, is resulting in a greater use of bakers' bread.

A Health Prescription

Dr. E. V. McCollum of John Hopkins University, leading nutritional authority, tells in five words how to keep the human family from starving on a full stomach: "Drink milk; eat leaf vegetables." Whole milk and leaf vegetables, such as lettuce, etc., contain an element that has not been seen but that is very essential to human life.

Bread made with milk and correspondingly good materials should command a higher price than water bread. This fact a baker can clearly establish in the minds of his customers, through his local advertising mediums, substantiating his statements by quoting such authorities as Dr. W. H. Eddy, of Teachers College, Columbia University, New York City, and Dr. Frederic W. Murphy of the New York Telegram. Dr. Eddy publicly stated that bread rich in milk solids should command a higher price than water bread, while Dr. Murphy recently published the following interesting statement in the food column, which he conducts for the New York Telegram:

"Sandwiches are excellent if made from proper materials. But sandwiches made from bread which retails to the consumer at eight cents per loaf are nothing but stomach burdens and worse than useless. A loaf of bread which contains all the nutritional elements necessary for human growth and continuity cannot be produced and sold at either wholesale or retail for eight cents per loaf. An eight cent loaf of bread cannot contain milk solids and the elements for nutrition found necessary by the experiments of Hale, Hoffman and McCollum. An eight cent loaf is commonly known in the trade as a 'water loaf,' and the toiler who eats sandwiches made from such bread is 'hacking the forest of his life' and living on 'expedience.'"

This subject is of utmost importance to the baker from two distinct viewpoints—one, the undeniable added nutritive value imparted to his bread by incorporating milk into the dough; and the other, which is a purely personal one, is that in the use of liberal amounts of milk in bread, the baker gains for himself an enviable reputation for making bread of excellent quality.

Please accept our compliments on the fine appearance of TECHNOLOGY. It should be a valued visitor in the office of every member and "May their tribe increase."

—B. F. Whitecar, Editor National Baker.

A Keen Test of Caveat Emptor

How Thousands of Tons of Raisins Were Kept Off the Market to Protect Their Good Name

By DR. C. F. RUDMANN

Research Department, American Institute of Baking

HAVE you, Mr. Baker, ever faced a dough that had got too old—with the temptation to throw it down the chute anyhow and put it out among your customers?

Have you ever, similarly, faced the problem of cripples—with the temptation to let them ride, as possibly the buyer would not notice?

It is one of the hardest jobs in the world to let a bird in the hand go free in order to get a hoped-for reward that is only a vision of something not yet available at best. Therefore this story. It concerns raisins as a filling for pies and for bread. But in principle it concerns every transaction that every baker may be called upon to make.

If any baker, for instance, called in his friends and the officers of his association, and asked them about some bad ingredient or rancid fat, or partly burned loaves, these friends would advise him against letting them out into trade. They would tell him the bad reaction would hurt him more tomorrow than the profits would benefit him to-day. But if left alone he possibly would struggle with the old spirit within him of "let the other fellow beware." It was the spirit that lent zest to the horse trader's varied life, and brought a smile of conquest to the farmer's face after he had loaded a case of eggs with rots and spots and checks in the middle—with choice eggs on top.

Well, now it happens that the raisins now being put into raisin pies and raisin bread in bake shops were ripened under very difficult conditions. There was more

rain than sunshine in the ripening period. The result was over 75,000 tons of raisins that did not mature. Instead of sugar developing in them mould and mustiness developed on their skins. If they were slipped into bread and pies they would sell—once, anyhow. If this was the only crop of raisins that had to be marketed it would show a high figure in the black side of the ledger to "ride these along with the rest." But in the case of raisins few vineyardists had to decide the question for themselves.

The raisin growers had their marketing association, and its president, Ralph Merritt, was looking at things in the light of a continuously cumulative morale, to be built up through decades, not seasons. He saw the 75,000 tons of grapes deficient in sugar as a menace to the sale of many more thousands of tons of good grapes, and as potential creators of distrust of raisin purchases. This distrust might be created in the mind of a buyer of a single loaf of bakers' raisin bread, and he might talk about it to somebody else who would thus be influenced against buying such a loaf. Thus a new "sales resistance" would be built up.

And how was the problem handled? President Merritt introduced into the market a new stock food. It was called "Raisina Stock Feed." The raisins were mixed with other ingredients until a desirable food was produced. It was sold at \$25 per ton to stockmen. Thus the principle of "Caveat Emptor," was crashed once again as a principle of merchandising, and every baker turning out

raisin products was protected against a chilling of his trade.

How California's valleys are slowly becoming raisin commonwealths as the merchandising of their raisins improves is told in the following third installment of Dr. Rudmann's series on the raisin culture of our West Coast.

The people of America who watch financial affairs saw something like a miracle in 1920 when certain farm sections collapsed into bankruptcy. They saw the California country save itself when all neighboring states to the eastward fell into the slough of financial despond. But even in California credits were strained. In the case of the raisin industry some growers were deceived by the high price of raisins right after the war and bought more land at high prices. Then came the reaction, and their co-operative selling organization came to the fore as a saving force.

In previous articles we told how the co-operative association began work, in 1912, after a period of very lean years for raisin growers, and how it grew in ten years from 6,500 members to 16,500 members.

They gradually worked to take the control of prices from the hands of speculators and bring this control into the hands of the growers. As this power was gathered in raisin production increased to an average of 70,000 tons per year.

When they were in control the speculators worked for margins, not for the marketing of raisins in volume. They thought of profits on each deal, not of profitably marketing the whole crop. When each new crop was due they dumped their holdings on the market to force down quotations. Then they would buy in the new crop at the ridiculously low price they had created and would start "skyrocketing" it again for margin profits until time to dump their surplus at the next harvest period.

Growers slowly saw through the market tricks of the speculators and made another try for co-operation.

Cash Capital Provided

Previous attempts had taught them that a cash capital to handle the raisins was necessary. So a million dollar company was planned with the growers as stockholders, upon the basis of a voting trust agreement. The raisin territory was divided into five districts, each district having five trustees chosen by the subscribers of stock. These trustees were elected November 15, 1921, for seven years and had full power to act for the stockholders who received stock certificates and then shares of stock at the end of the trusteeship. This voting trust agreement prevented outside interests from gaining control of voting the stock and converting the organization into a private corporation.

Subscriptions were taken during 1912, and after subscriptions totalled \$750,000 the trustees incorporated under the name of the "California Associated Raisin Company," and elected seven directors. It was soon decided that for effective stabilization of raisin prices, the organization should sign up at least sixty percent of the raisin acreage of the state for three years with an option on the part of the company for an additional two years. Over 60 per cent were obtained by April, 1913, and the Association bought from the growers 25,000 tons of the previous 1912 crop in order to be able to maintain prices the following year. These were bought for two and three-fourths cents per pound although the independent packers would offer no more than one and three-fourths to two cents a pound—with few purchases at this rate.

At the beginning, the organization had no packing houses and contracted with fourteen different packing houses, allow-

ing them a profit of five dollars a ton but insisted on the right to sell direct to the trade. The financial problem was a very serious one. Over a million dollars was needed to handle the hold-over crop of 1912; three million dollars for the initial payment of the 1913 crop, at the promised minimum price of three and one-fourth cents a pound on delivery, warehouse capacity was also necessary. The million dollars was but \$300,000 in cash—the balance being growers' notes. The emergency was met by advances from banks on raisins stored with the warehouse company, and by money due the growers for raisins

was appropriated, a large advertising firm was put in charge, and the "Bear Brand" trade mark adopted. This was later, in 1914, changed to the "Sun Maid" brand.

In a year or so the benefit of the advertising became apparent in the increased consumption. Expense for advertising was easily justified by the results and the appropriation increased twenty-fold. Figures showing yield and advertising expense are shown herewith:

In 1917 the original contracts and options had expired and new contracts were necessary. Control of 125,000 acres was

HOW ADVERTISING PAID IN SALES

Year	Tons	Rec'd by Growers	Per-Ton	Per Lb.	Gross Sales	Advertising
1912	24,512	\$ 1,499,470.71	\$ 61.17	3.059c	\$ 2,106,450.96	
1913	59,228	4,275,743.67	72.19	3.609c	6,187,117.38	
1914	73,635	3,244,725.21	71.23	3.561c	8,414,660.75	\$ 120,803.74
1915	98,405	7,370,808.99	76.94	3.846c	11,969,494.45	240,035.83
1916	107,039	10,252,597.77	95.88	4.793c	13,595,227.30	219,592.29
1917	127,212	13,992,787.59	109.99	5.499c	16,685,244.05	287,000.00
1918	149,713	15,530,045.01	110.41	5.520c	23,200,184.42	291,756.44
1919	159,262	36,345,138.43	228.21	11.410c	43,280,254.41	374,147.11
1920	152,497	38,456,827.82*	251.92	12.695c	38,568,927.74	1,261,342.72
1921	138,500	Total California Production				2,139,567.47
1922	235,000	Total California Production				2,530,000.00
1923	190,000	Total California Production.				

* Note in the above table that in the year 1920 that \$38,456,827 was paid to 14,000 growers; the average was less than \$3,000.

but permitted by them to remain at interest with the organization for the time being. The trade gradually placed more confidence in the new concern and the members received more than the guaranteed price.

The First Advertising

Perhaps the first real improvement made by the Association was the beginning of an advertising campaign. As mentioned previously, the consumption had increased to an insufficient maximum, and it was suggested that the public be educated to the value of raisins at times other than during the holiday season. \$120,000

set as the requirements for continued operation of the co-operative organization. The campaign resulted in a membership of 9,200 growers representing some 130,000 acres, or 88 per cent of the entire acreage of the state. To prevent loss of acreage on transfer of vineyards, provision was made that the agreement be binding, in the event of the sale of a vineyard under contract.

Under the original contract, the grower was charged his pro rata share of operating and \$5 per ton, which the Association kept for various administrative expenses, dividends, and surplus. The grower re-

ceived the minimum price fixed by the officers and any excess if the raisins sold for a higher price.

The 1917 contract provided for the deduction of \$5 per ton as before for various expenses, but stated that after deducting enough to pay 8 per cent on the issued capital stock, the balance should be returned to the growers in stock or in cash, at the option of the company. The 1921 contract provided for a payment in shares of stock of not more the \$4 per ton on deliveries in any one season. By these methods the grower marketing raisins through the company has an opportunity to become a stockholder.

In 1918, leases with the outside packers expired and the Association decided to build their own plants; the first one was built at Clovis, and the number gradually increased until there are now twenty-eight packing plants owned and operated by the Association. The main plant is number four, located at Fresno, and valued at over \$2,000,000. In addition, there are over twenty plants, used mostly as receiving stations, in different parts of the raisin district. Most of these are leased from private concerns.

Break Power of Brokers

Another important change was made in 1921. Brokers had previously been handling the sales of the crop, which was satisfactory with a crop of 100,000 tons. But as this increased to 200,000 tons, and especially as the large acreage planted as a result of the war boom promised a crop of 400,000 to 500,000 tons by 1925 and 1926, intensive sales efforts were required. It was easily seen that brokers could not give their entire time to raisin marketing nor could their limited organizations satisfactorily develop new outlets in small towns and communities. After a thorough study of the situation, two division sales offices were opened, January, 1921, in New

York and Chicago, closely followed by eighteen additional offices in the United States and Canada. In March of the following year the first foreign office was opened in London, with others later in Shanghai and more recently in South America. In the same year, 1921, the name was changed from the California Associated Raisin Company to the Sun Maid Raisin Growers.

Sun Maid Raisins (California produces over 69% of the world's supply) are now being sold over all the world—although not to a large extent as yet. Competition with home grown raisins is met in New Zealand, South Africa, to some extent in South America, and very strongly in the Mediterranean countries, which have produced raisins for centuries. These same countries have been sending raisins all over the world. The following figures show export and import data, the imported raisins being used chiefly by the Eastern States:

UNITED STATES EXPORTS AND IMPORTS OF RAISINS

Fiscal Year	Exports (Lbs.)	Imports (Lbs.)
1910-11	18,659,992	2,479,220
1911-12	19,040,046	3,255,861
1912-13	28,120,507	2,579,705
1913-14	14,766,416	4,554,549
1914-15	24,845,414	2,808,806
1915-16	75,014,753	1,024,296
1916-17	51,992,514	1,850,219
1917-18	54,987,793	843,533
1918-19	84,150,060	119,969
1919-20	86,857,496	13,897,417
1920-21	24,492,455	43,268,689
1921-22	49,639,114	18,363,428
1922-23	93,962,362	12,334,736

It might seem from reading thus far that everything went along smoothly with the organization. Life gives most of us a bump now and then and this was also the case with the growers. There were various troubles and misunderstandings; but prices, market and all were much more satisfactory than before the co-oper-

ation began—and then came the World War. During the war raisin prices, like all costs, increased. The growers became enthusiastic, some of them bought land at high figures, many planted new vines, while all rejoiced in the high returns. Returns to the grower reached a peak of almost thirteen cents per pound, compared to one and two cents ten years before.

Effect of World War

The rise in raisin prices was slower than that of many other commodities, and for some reason the drop was also delayed. In fact, the growers had the delusion that the price would remain high; for other products had fallen in price while the raisins remained high. A price thought reasonable the following year was fixed; but shortly afterwards there came a lessening demand—which shows the difficulty of setting a price for the next twelve months. A high price proved to be of no advantage when the crop was not being sold or had to be sold at a loss. The co-operative association found it had to set a price that would dispose of the goods for their members. Price control proved not to be easy here, for production could not be lessened easily or increased as in a manufacturing plant; the vines had to be three years old before they began bearing, and they required much care and labor during these years.

Lowered Selling Price

To move the raisins the selling price was lowered and the Association did everything possible to get back to normal conditions, but had many obstacles to overcome. The last Association contract prior to 1923 had promised the grower \$85 per ton, which was entirely too high under post war conditions and caused banks to refuse loans. Most co-operative organizations do not make the mistake of having a fixed minimum advance. There was again the lack of capital, which

had always been present to some extent and which became worse as production increased. Although the capital stock had been increased about two years before so that over \$2,000,000 had been paid in, and the plant inventory was now around \$4,000,000, this was hardly enough to encourage needed loans of \$20,000,000 or more.

In addition, the organization had apparently grown too fast to keep up to date and found itself failing to meet certain laws for co-operative organizations. For example, according to the Capper-Volstead Act a co-operative association must have only producers as members holding voting power. In the Sun Maid Raisin Growers Association fifteen per cent of the stock was held by merchants and others no longer producers of raisins. Plans for a much needed reorganization were made, submitted to and approved by legal and financial officers of the government. The details are too long for this article but will be set forth in another installment.

(To be Continued)

Breading for Mother

The Chicago Tribune prints little stories of children, for which it pays their fond mothers small sums if the stories sent in are good enough to print. Three mothers who desired loaves of bread produced this contribution from one of them:

"I sent Richard for a loaf of bread and on the way he met two of his playmates going to the corner grocery on the same mission. When he returned he told me of meeting the other boys and in his droll way said, 'And there we were—all three going breading for our mothers.'"

Every man owes a part of his time to the upbuilding of the business or profession to which he belongs.

—THEODORE ROOSEVELT.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of "BAKING TECHNOLOGY", published monthly at Post Office at Chicago, Illinois, for April 1st, 1924.

State of Illinois, County of Cook, ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared I. K. Russell, who, having been duly sworn according to law, deposes and says that he is the editor of the "BAKING TECHNOLOGY" and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—American Institute of Baking, 1135 Fullerton Ave., Chicago, Ill.

Editor—I. K. Russell, 1135 Fullerton Ave., Chicago, Ill.

Managing Editor—None.

Business Managers—None.

2. That the owner is:

American Institute of Baking, a corporation not organized for profit; H. E. Barnard, Secy. and Business Manager; M. L. Marshall, Treasurer; J. M. Livingston, Chairman; L. F. Bolser, First Vice-Chairman; A. H. Hathaway, Second Vice-Chairman.

3. That the known bondholders, mortgages, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

I. K. RUSSELL,

Sworn to and subscribed before me this 21st day of March, 1924.

ROSABELLE E. PRIDDAT,

(Seal) Notary Public

My commission expires August, 1924.

A Sermonette

If you want to reach prominence in your field of work, if you hope to be successful, be a student of the literature of your business. Read something worth while. Don't waste your leisure moments over the pages of the multitude of magazines of "Sloppy Stories," "Fiery Fiction," and "Hollywood Hop."

—An Editorial in Bakers' Weekly.

One of the most interesting broadsides that comes to the American Institute from any corner of the baking world is The Holsum Herald from the Log Cabin Baking Co., at Portland.

It seems to be addressed mostly to grocers—and after all grocers are the most important factor in a wholesale bread baker's merchandising, for they are actually at the contact point with the public.

"A store doesn't have to be a big store or a small store to be a good store," suggests this useful paper, "but it has to be a tempting store. The good grocer doesn't push his goods. He lets his customers pull them."

The Herald tells the grocer who sells the Log Cabin bread all about the quality of goods the company puts into it, the

Another Bread Ad

An item in Baking Technology pointing out the combination of bread and other foodstuffs and the desirability of advertising the two together attracted my attention. I put the idea to work in the summer advertising for Vegex, which has just gone across my desk. Sandwiches are used as a basis for building the whole advertising campaign, and more than 2,000,000 copies of our cook books, of which I inclose you a copy, have been distributed. The man who makes the sandwich filler helps carry bread to market, I find, just as the man who makes the bread helps carry the sandwich filler to market.

—E. A. Rumely, New York.

Summertime's Bakery Ills

*They Must be Watched for with Eternal Vigilance to
Prevent Costly Epidemics in the Shop*

IF someone would invent a radio for the eye that would increase its power of vision as greatly as wireless receiving sets have increased the audibility of the ear, each baker could see in the air around him a great multitude of creatures, each doing daily combat with him for his bakery output.

These creatures know that bread is their best food as much as we humans do. They practice the principle of "eat more of it" also, if they get the slightest chance. When they start to make a meal of the baker's loaf, they color it all up green, in the case of one of them called "mold." Or black, if the creature finding a foothold on the loaf happens to be of another variety of mold. Again, the aerial warrior may be of the species that makes the bread stringy, smelly, and bad for the palate. Then the invader has given the loaf a case of "rope."

There is no getting away from these aerial crusaders. Tests have shown that they blow about on every breeze, not only in the bakery, but everywhere that breezes blow. They attach themselves to practically all dust. If a loaf of moldy bread is tolerated anywhere in the bakery, no matter in what obscure corner, that one loaf can infect the whole bakery to epidemic proportions. For every particle that is visible is shedding smaller particles into the air in groups of from 500 to 1,000 from each little mold "seed pod."

Bakers must remember always that they need moisture, warmth, and sugar to grow upon. Rob them of any of these elements and you thwart their invasion of the bread. We once met a woman baker weeping because her "country bread" all

came back from dissatisfied customers covered with mold. They were storing it "to keep it fresh through the week" in damp cellars where the family milk pans used to sit while creaming. We advised her to get them to change the storage place to a dry, sunlit place with plenty of ventilation. She had no more trouble.

Molds cause a loss of thousands of dollars a year to the bakers of the United States. In order to lessen this loss the nature of molds and mold infection should be thoroughly studied.

A mold is a living plant that consists of a mass of cotton-like threads. Stalks arise from these threads on which spores are born. The mold spores are the "seeds" of the mold plant. These "seeds" are considerably smaller than the seeds of the wheat plant, even reaching the minute size of one fifteen thousandth of an inch in diameter. A single piece of moldy bread can be the source of billions of spores.

Mold originates on the outside of the loaf first. Bread is sterile when it leaves the oven, as far as molds are concerned, for the baking temperature kills them, as it does the yeast in the bread.

Mold infection takes place after the bread leaves the oven and is due to air, handling, racks, wrapping machinery and wrapping paper. Dusting flour that is flying in the air is quite a common source of mold infection.

Bread that is wrapped too warm will "sweat," and as stated before, mold spores require plenty of moisture in order to germinate and develop. Bread should be cooled from one to two hours, depend-

ing upon the temperature of the wrapping room and whether it is summer or winter.

Sanitation as a Cure

Another most important factor in the lessening of mold infection is that of sanitary conditions in the shop. The sanitary precautions include the scrubbing of floors, the cleansing of racks and machinery, the washing of walls and ceilings at intervals, with antiseptic solutions, the wrapping of bread in a clean, sanitary room where there is cool air and plenty of sunlight. **Moldy bread or moldy material of any kind should not be brought into the bakery.**

Rope is another serious bread disease that makes its appearance with the first signs of warm weather.

Rope is a bread disease that is caused by a bacterium. Rope bacteria are distributed everywhere in nature and are present in the soil, water, cereal grains, and are nearly always present on potatoes.

The Plague of Rope

Under proper temperature and moisture conditions and in a neutral to alkaline dough, rope will develop within 24 hours. The first sign of rope is noticed by an odor of over-ripe melons. Later the crumb becomes darker in color and changes to a sticky mass that can be drawn out in threads.

Rope bacteria, unlike molds, are able to produce spores that survive the baking temperature. After the bread leaves the oven the spores will germinate and develop under the conditions given above.

Rope will not develop under acid conditions of growth. Therefore, by using acids in the dough rope can absolutely be eliminated. The most common acid used is acetic, the acid contained in vinegar. If rope appears use a quart of commercial vinegar (4% or 40 grain) to a barrel of flour. Decrease the quantity of vinegar used after a few days, but allow a safe

margin in order to insure freedom from rope. In addition to this precaution, the bakery should be thoroughly cleaned. Proof boxes should be fumigated. Utensils, troughs and mixers should be washed with hot vinegar solution.

If the above precautions are carried out I am sure you will notice a decrease in mold and rope infections. Any one finding an epidemic of either plague getting the best of him should write to the American Institute at once, and our whole resources will be made available to affecting an immediate cure.

—Harold E. Turley.

Toast for Luncheon

HOW many bakers have noticed the amazing growth of "lunch shops" which serve increasing crowds with toasted sandwiches, coffee and a dessert at noon?

The toasted sandwiches are nearly always "three deckers" and are made really inviting through the skillful use of fillers in wide variety.

"I intended to write to you a little of the Dixie Toast and Waffle Shop," runs a letter from an Indianapolis friend. "It was started here recently on north Illinois street. It is a quaint little place where they serve nothing but toast sandwiches. We have been eating our noon lunches there this week. I spoke to the manager this noon—told him of the work of the Institute and asked him for a copy of the menu, which I inclose."

These restaurants are increasing at such a pace that it would pay bakers to make close and friendly contact with them and see to it that they get the best possible bread, so merchandised that they will always receive it in the best of condition. The baker may well look over the restaurant man's head to the morale his bread makes with its consumers, and work with the restaurant man to capture and hold that popularity.

Books for the Baking Laboratory

MRS. ALLEN ON COOKING, MENUS, SERVICE, By Ida C. Bailey Allen. Doubleday, Page & Co., New York. 975pp. 38 illustrations.

Cook books are rarely written; they are patch-worked together with scissors and paste pot. Sometimes a manual of cookery achieves such distinction because of the very skill of its craftsmanship that it earns a place in the kitchen library. And now comes a collection of household hints, tested recipes and dining room homilies so splendidly chosen, so entertainingly woven into a masterpiece of household literature, so beautifully balanced between instructive editorials, nutritional science, and clear cut formulas, that Ida C. Bailey Allen's latest book for homemakers demands a place in every library and takes first place in the literature of cookery.

Mrs. Allen brings into homemaking a vision of intelligent service, of opportunity and of aspiration which dignifies it as "one of the biggest jobs in the world." And she permeates the routine of housework and the round of food preparation with the real beauty of the kitchen and the true science of cookery. Chemists, appreciating the application of science to homemaking in the eternal warfare against dirt as well as in the preparation of nutritious and balanced rations, will find in Mrs. Allen an author who writes with accuracy and knowledge.

And bakers who have always found cook books committed to the development and perpetuation of home cookery will rejoice at the sane, logical and open-minded manner in which Mrs. Allen discusses such subjects as whole grain cereals, white bread, electric toasters and baker's bread. While the author points out the special virtues of whole wheat breads, she also gives full recognition to white bread, "that good old standby." And bakers' bread is described as "good, wholesome, of fine grain and texture, and well flavoured." The attention of the housewife who buys her bread is directed to such pertinent subjects as the sanitation of the bakery, the quality of bread ingredients, the protection of the finished loaves.

But of most interest to the baker reader is the statement that the reason why more whole wheat bread is not eaten is because the housewife does not create the demand for it. This logical statement is refreshing after the years of insistence that bakers are deliberately destroying modern civilization because they refuse to bake whole wheat bread.

Mrs. Allen is one author who recognizes the

patent fact that the baking of bread is a manufacturing business and that the baker makes the product consumers want.

In a beautiful editorial, "The Whole Loaf," is pictured the awakened soul of a mother who, failing in her desire to find expression in art or music, at last comes to see in her littlest child, well fed with bread and milk, the complete realization of her dreams.

Full recognition is given to the important though little understood vitamins, and their value in the dietary is defined as clearly as that hitherto held by the fats, proteins and carbohydrates.

Every one who finds joy in cookery will read this book and gain new inspiration, and the host of women to whom mealtime means only one more job over may perhaps glimpse through its pages to a clearer vision of the major importance of the place proper nutrition plays in health and happiness.

—H. E. B.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Determination of alcohol in bread. Thure Sundberg. *Ann. fals.* 16, 531-34 (1923).—See C. A. 17, 2155.

A. Papineau-Couture.

Wheat gluten. J. Gerum and Chr. Metzger. *Z. Nahr. Genussm.* 46, 74-86 (1923); cf. C. A. 16, 3979.—Continuation of the study of the relationships between P_2O_5 and gluten. The amount of P_2O_5 in the gluten increases and the P:N ratio decreases with an increase in the amount of wheat constituents in wheat flour. In mixtures of wheat and rye flours the dry gluten content is sometimes lower and sometimes higher than that calculated when assuming the rye to be an indifferent diluent. The P:N ratio is scarcely changed by the admixture of rye flour to those wheat flours which fall between the grades 55 and 75%. With the 85% wheat flour grade and flour from which the first runnings have been removed the addition of rye flour increases the ratio. Theories of wheat gluten formation are discussed from the standpoint of colloidal chemistry. The proteins in rye apparently

play a part in gluten formation in rye-wheat mixtures.

L. D. Elliot.

An examination of some self-rising flours. L. H. Bailey. J. Am. Assoc. Cereal Chem. 8, 119-24 (1923).—The annual output of self-rising flours in the United States is estimated at ten million pounds. A large part of it is made by mixing $\text{CaH}_4(\text{PO}_4)_2$, $2\text{H}_2\text{O}$, NaHCO_3 , and NaCl with soft wheat flour. About 90 samples were collected from manufacturers and dealers throughout the Southern States. All were made into biscuits at the U. S. B. C., 7 biscuits to each baking and these when cool measured for volume. The average volume for seven biscuits was 599 c.c., the maximum 640 c.c. and the minimum 460 c.c. The average weight 217, maximum 244, minimum 186. Conclusion: "A large proportion of the self-rising flours taken from the ordinary channels of trade was capable of producing biscuit that had good color and appearance. They were well leavened and palatable. The characteristic yellow color of many of the biscuits was undoubtedly due to excess soda. A grey or dark color was due to low-grade flours."

H. S. B.

Contribution to the study of fermentation in bread making. G. Chabot. Bull. soc. chim. Belg. 32, 346, (1923).—Chabot has investigated the influence of hydrogen-ion concentration on the rising of wheat flour and ordinary bakers' yeast; all tests were made with 25 c.c. water, 50 g. flour, and 1 g. yeast. The range of pH values covered was from 5.9 (distilled water) to 4.3, these values being determined after the fermentation. In all tests the fermentation was increased by acidification: differences in degree were found with different yeasts. With only one yeast was a maximum effect observed the corresponding pH value was 5.2.

W. B. Plummer.

Vitamin B in certain foods. G. Petragani. Rend. d. adunanze dell'accad. med. fis. fiorentina; Sperimentale 77, 215-16 (1923).—Beans have a much lower content of Vitamine B than fresh peas, and "pinoli" contain none. White bread is also negative. Experiments with human milk and colostrum, and cow milk were inconclusive.

M. H.

Value of cereals established by research. M. S. Fine. Am. Food J. 18, 511-2, 543-4, (1923).

—A study of vitamin B potency of "Grape Nuts" and "Post's Bran Flakes" is presented.

H. A. Lepper.

The biological evaluation of the foodstuffs. I. Berczeller and A. Billig. Biochem. Z. 139, 470-5 (1923); cf. C. A. 16, 2531.—Rats fed starch alone consumed their body weight in starch in $3\frac{1}{2}$ to 5 days. On wheat or rye flours the average daily food consumption was one-half to one-third as great. Starch-fed rats kept at 35-7 degrees fared better and consumed less food than when kept at room temperature.

George Eric Simpson.

Some unsuspected factors in the rancidity problem. David Wesson. Cotton Oil Press, 7, No. 9, 38-9 (Jan. 1924).—The rate at which rancidity develops in baked goods may be materially affected by the quality of the flour. Wheat oil which is present in all wheat flours becomes rancid quickly and free oleic acid increases the rate of formation of compounds, giving the Kreis rancidity test. The probable keeping quality of fats may be determined by Bailey's accelerated rancidity test (C. A. 18, 336). By this method lard shows decomposition under the test conditions in 45 minutes, oleo oil in from 1 to $5\frac{1}{4}$ hours, Wesson Oil in 5 hours, and new wheat oil in $4\frac{1}{2}$ hours.

H. S. B.

Patents

Bread enriched with vitamins. G. S. Ward. U. S. 1,474,746, Nov. 20. A bread stated to contain substantially all essential nutrient materials for health and growth (except antiscorbutic vitamin C) may be prepared from flour 196, whole milk (containing $3\frac{1}{2}\%$ butter fat and $12\frac{1}{2}\%$ total solids) 135, whole milk powder 5, oleo oil 6, salt $3\frac{1}{2}$, the vitamin preparation described in U. S. patent 1,431,525, (C. A. 16, 4287) 10 pounds, Ca acid phosphate 12, CaSO_4 8 and Ca CO_3 4 oz. A dough of this composition is preferably run as a "cool" dough, being set from a mixer at a temperature of not over 25.6 degrees. The use of solids of whole milk (amounting to 10-12% the weight of bolted white wheat flour used in the dough batch) is resorted to to supply necessary proteins.

Sweetness of saccharin (Magidson, Gorbachov). 10. An accelerated rancidity test. (Bailey, Ebert) 27. Bleaching flour. (Brit. Pat. 200,508) 10.

Good Loaves Made Better

IT is with no intent to play the philanthropist or unselfish benefactor that the American Institute of Baking asks for loaves of bread from all bakers dissatisfied with their product, and then studies each loaf received with intent to find ways and means to make it better.

The enlightened bakers who founded this Institute knew it must serve all or it could serve none—that every bad loaf of bread sent to a consumer made a bad friend for the baking industry, and hindered the merchandising of the nation's bread crop as a whole.

They also knew that the bread crop was the wheat crop merely in another form, and that the more tasty and appetizing the baker could be in preparing wheaten foods, the more wheat sales the farmer would have, so that there would be less distress wheat to bankrupt him.

As these words were written, the present writer dropped down to the Institute's Service Laboratory. There is no telling what kind of necromancy O. W. Hall is up to in that laboratory. One day he is showing an irate baker that his flour is all right in spite of his bad opinion of it—only it has been badly handled. And he starts the baker off to a new success.

But today we found him trouble-shooting in a new direction. He had a loaf of bread—the fourth in a series that had come from one baker. He was happy, of course, for this loaf he was scoring 94, and very few loaves reaching this Institute score over 90. The highest score ever given was 96½. A month ago bread from the same baker who sent in this excellent loaf scored only 70.

As just one little example of service that now includes handling and analyzing the virtues and faults of over 1,000 loaves of bread per month—a service given with-

out fees to all Association members—we may tell the story of this one baker's poor bread that was changed into excellent bread. He started to use the No Dough Time Process, and got excellent bread as long as the demonstrator remained close at hand. Then he was so confident of himself that he changed the temperature requirements and the formula. His bread fell away off, and became practically tasteless and flavorless, with poor volume, poor grain, poor color, and poor texture. He was advised to increase his yeast, to increase the mixing temperature. He was so stubborn in his pride of self-knowledge that he would do neither.

So in desperation he was advised to let the dough lie in the mixer 25 minutes after mixing, then to use it as a No Dough Time dough. He did this, and the smaller amount of yeast had time to do its work in the longer time at a lower than optimum temperature. And his bread took on again its lost volume and flavor.

"I consider," he wrote in to the Institute, "that your advice is well worth the \$25 a year I pay for dues."

He is only one of a great many of a similar mind. Only this "great many" could be a great many more without pressing the resources of the Institute. Bakers must see the national scope of quality baking before they can play their proper role as a factor of the baking industry. Many people travel now. They must get excellent bread, not only from a carefully chosen dealer at home, but from any dealer they encounter anywhere. Thus will confidence in the industry grow, that will mean a larger and larger dependence on the bread ration and a less desire to seek "something else" on the menu card of Pullman diner, restaurant, hotel, or boarding house.

BAKING TECHNOLOGY

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Our Atlantic City Exhibit

BECAUSE the baking industry is changing as rapidly as any other phase of American life, or more so, bakers who attend the Atlantic City convention in September will be able to study an exhibit that may mean much more to them in the future than it has in the past. This exhibit is now being prepared, and it consists of the best examples of wheat-
foods advertising created by any baker, yeast man, flour man, machinery man, supplies man, butter man, meat man, cheese man, or milk man, who is willing to share his work for the greater good of the whole baking industry. Informally,

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in fact, this exhibit creates a Wheat-
foods Industry, whose component
factions will be fitted together into the
harmonious whole which all, as separate
parts, are now informally joining to
create. The idea for such a great exhibit
was brought to the American Institute
by Elmer Cline, who has long given his
best endeavors to creating bread and
baked goods messages for the consumers of these

products in the American home.

Mr. Cline has seen baking come forward from the days when the baker's first duty was to his dough trough. With his head bowed down and his arms at work knead-

ing the dough, the baker used up all his strength in the thirty or more batches he had to bake a day.

In those good old days, which happily are gone forever, the baker's wife did such merchandising as was done. She sold the bread "over the counter" to those who walked to the bakery for it. Or, if the baker had many children and was adventurous, he sent the older ones out with "route baskets."

As the baker traded his job at the dough trough to a machine, and put electric motors to work instead of human muscle, he found new tasks to command his attention. Merely mixing the dough was not enough. The Science of Baking had come into existence and must be mastered. Those who learned that yeast made flavor as well as furnishing leavening gases, gained a new popularity for their product, for they used an abundant quantity of yeast to bring out the best flavors of the wheat berry. Those who learned that milk, added to plenty of yeast, brought enriching ingredients that had their own appeal to the appetite, found their investment in milk paid them abundantly. And just so those prospered, again, who learned that a milk-mixed loaf had to be baked in a sanitary shop that was so spotless it would appeal to every housewife.

Elmer Cline's thesis, which he brought up from Indianapolis and laid before the Board of Governors and President Raymond K. Stritzinger of American Bakers Association, is that the quality loaf of bread, baked with a rich milk content in the most sanitary shop that can be erected, is still not enough.

All these factors fail to gain a commanding respect for the baker's product until the housewife knows all about them. She must have the story carried to her; taken right into the home.

Sometimes the children make the best

method of approach. Therefore one baker devised a number of "animal cut-outs" to keep children busy with pastepot and scissors.

While they paste and cut they find little verses to repeat which tell them the story of the baker's quality bread,—what it will do in building their teeth and bone structure and in creating vitality and "pep" as the human family's basic diet.

This baker's collection of animal cut-outs will be on exhibit at the pier—freely offered without charge to the industry for the benefit of all who are struck with the value of such a service. The story of how successfully the plan worked for the baker who tried it will be there too—as an assay report on how well this mine of information worked.

Bakery Pictures

Bakery pictures will be on exhibit, in sequence from the freight car, where the flour is received, to the delivery wagon in which the bread goes to the consumer's home.

A. B. Hastings & Sons, of Campello, Mass., devised a beautiful folder which told the story of their bakery in picture form, with slight captions to emphasize the meaning of the pictures themselves.

They mailed it direct to the homes—not of users of their product especially, but to all women of their city, hoping especially to reach home bakers.

The result was startling. Of the broadsides, 20,000 were mailed into bread consumers' homes. They asked the recipients to send in trial orders for cakes, if they wanted to see how good the cakes were, for instance. A total of 1,500 letters arrived at the bakery within the next week. Each one contained an order for one or more of the bakery's products.

The American Institute asked for some copies of this broadside to put on exhibit at the Atlantic City convention and to

keep permanently on exhibit at the Institute for bakers to study. A number were furnished at once and with them came a letter from A. B. Hastings, Jr., which stated:

"I really feel that this sort of educational advertising is exactly what the industry needs and has needed for a long time, so that anything I can do to help the good cause along I will do willingly."

Thus one example of successful advertising was added to the Institute's Atlantic City exhibit.

Time to Concentrate Here

The organization of the American Society of Bakery Engineers marked a distinct epoch in the larger organization of the baking industry for greater service. The engineers were organized to professionalize bakery production work. Backed by the American Institute of Baking, whose research laboratories and School of Baking lead production managers to the solution of every problem of production, the Society of Bakery Engineers can now do the bread producing in the most advanced manner.

Just as the bakery owner reached a time when he could lift up his head from the dough trough, and could trade his delivery problem off to motor trucks, and his oven labor to employees, so the bakery owner has now reached the point where he can hire an expert to do better than ever he could himself with the production problem.

That is a specialized service with a personnel available to take care of it. If the bakery has any problem that cannot be solved locally, a letter to Richard Wahl, president, American Society of Bakery Engineers, will bring data that is the latest word in bakery method. The baker here has on call the same service the medical practitioner has at the large hospital clinics.

And if the bakery owner can now turn away, safely and even with profit to himself, from production worries, where then should he concentrate?

"On advertising his product," says Elmer Cline, "and by advertising I mean engaging in every form of sales promotion. I don't mean merely newspaper display advertising, window advertising, billboard advertising, or plant advertising through inviting people to visit the scene of bakery production.

"I mean a full realization of the fact that a new generation comes into the horizon every ten years and it is necessary to resell the product every ten years to keep the oncoming generations fully alert as to what the bakery can do for them.

"I am thinking as the task of organizing this big trade promotion exhibit looms ahead, of how foolish would sound today, the features of the baker's story that resounded through the land with such success ten years ago. Then housewives really distrusted the baker and had to be "shown" that bakers had really reached sanitary ideals. Now they take it for granted that the sanitary conditions in the bakery are right, just as the automobile buyer takes it for granted that the engine in the car is right and the axle bearings will sustain the car through its journeys. They look for comfort in the springs and beauty in the car lines—and buy on those.

"Automobile advertising constantly changes. So must bakery advertising. And there is no way to educate the whole industry as to what is best that will work so well as bringing together all that has been accomplished—and has proven itself in action."

From William Fisch

In just the spirit spoken of by Mr. Cline, bakers in all parts of the country

have come forward with ideas for the consolidated exhibit. It will be the only exhibit planned by the Association as a whole. The Beech-nut Packing Company developed some splendid advertising examples, and freely offered them for the exhibit.

Some examples of this advertising were sent to William Fisch, at Atlanta, Ga., as samples of what can be done.

"They are splendid," this Atlanta baker replied, "and the baker should reciprocate for the kindly co-operation shown by featuring other products that naturally go with bread, in his bakery advertising. We are sending you miniatures of our 1924 poster advertising. In these, and also in our newspaper and other advertising, we try to feature other food products with bread so as to make the strongest possible appetite appeal."

Billboards On the Way

Bakers en route to the Atlantic City convention will begin to get their education while on their way to the convention city. The Fleischmann Co., for instance, has just released for billboard use one of the most beautiful pictures that ever graced a public billboard. Butter manufacturers, meat packers, flour merchants, and other groups interested in bread merchandising are designing beautiful billboard posters. These will be featured on the billboards in Atlantic City and along the railroad tracks between Philadelphia and Atlantic City. They will give an outdoors, or field course, in this phase of the art of trade promotion.

Collecting On the Coast

As these words are written, L. A. Rumsey, of the Institute staff, is on his way to Los Angeles, especially to arrange for groups of advertising matter for the Atlantic City exhibit. He will find out, in consultation with successful bakers in Los Angeles, what methods they have used

to the best advantage. He will then proceed to San Francisco and study the situation there. He will obtain examples of the methods that have been used and will ship the trade promotion material discovered to the Institute, to be arranged for the Atlantic City showing.

From San Francisco he will proceed northward to Seattle, Tacoma, Portland, and Vancouver, B. C., and will then come eastward through Spokane and Butte to Minneapolis and St. Paul. After this trip is completed, and collection of successful Western advertising data is made, the eastern centers will be visited for the same purpose. By September a National survey will be accomplished and its results laid before the baking industry.

It is thought that each baker with a problem of his own will study the whole field and cleave unto those ideas that seem to him to fit his own needs. He can then turn these ideas over to an advertising agency in his home town, or to a publicity manager, or attend to them himself. The point is that he will gain a comprehension of the field impossible to attain at home, or through seeking any professional advice which itself has not been trained and educated through a nation-wide contact with the problem.

An End to Selfishness

This exhibit, of course, ends within the industry the clutchy spirit of jealous selfishness that once ruled throughout. All remember when the baker feared to let a competitor into his shop—jealously guarding all its features as "shop secrets." In that day librarians guarded the books with such jealous resentment against users that library applicants were treated always as potential thieves. Park superintendents guarded their parks with voracious opposition to every one who came to play. It took thirty years of effort to back librarians down from the

watchful bulldog attitude towards their books, and to back park custodians away from the "Keep off the Grass" spirit towards their domain.

What the new world-wide spirit here brought into the baking industry means is that co-operation pays and that bakers are not mere competitors, jealously fighting for a preponderance of trade, each for himself, but rather are servants of the Growing Civilization, sharing together the responsibility of building a basic industry to the full power of its potential growth.

At Atlantic City, then, there will be in this one convention feature, a new industrial conception in action. Alone it should be worth the journey to any member of the industry.

A Story of Advertising

ONCE upon a time there were two French perfume manufacturers. One of them believed in advertising; the other did not. The believer in advertising made a good quality of perfume. Each year he set aside a good percentage of the money he made to be used in telling the people about his product. Each year more and more people thus learned of the rare quality of his product.

They tried it, liked it, and his business grew beyond all expectations. He became the leading citizen of his town, because his city became known throughout the world as the city where his rare perfumes were made.

But his friend who did not believe in advertising grew in entirely a different way. He saved all he made each year and put his surplus back into better and better quality, and more and more experimentation to find the highest in quality. He even put slips of paper in with each bottle telling his customers what he was doing for them with the money others spent in advertising. He knew how to

make good perfumery and his pride was to turn out such a product. But his business did not grow. He could not understand it. He was turning out the very best perfume, **but nobody except himself knew about it.** You had first to be a convert and to buy his perfume before you could find out how good it was. If he had only had the vision to tell the world about his product he no doubt would have grown to a greater success than his competitor. —Elmer Cline.

Graf of Bozeman

FEW spots in the Great West are so rich in romantic history as the Old Bozeman Trail. Friends of Theodore Roosevelt, when he was a Montana and Dakota cowboy, opened the trail, and from the start it was richly caparisoned with picturesque murderers, stage-coach robbers, wild gun spinners, Indian pillagers, and all that went to make the Wild West wild. Bozeman, beautiful town whose name was attached to the trail although now it advertises itself as "on the Yellowstone trail," works and boosts for a "better, bigger, busier Bozeman." And while its second and third generation of folks work for a greater Montana, Graf furnishes them with the fuel of life in the form of bread. His Bon Ton bakery is run by a man of a peculiar and outstanding personality. It is not surprising, therefore, when Institute staff members receive a letter from him about baking, on the letter side, there is a lithograph on the reverse side which compels us to think of Bozeman, the Yellowstone Trail, the Rockies, and the great church steeples and capitol building that the people of Bozeman, busy boosters that they are, have erected to embellish their town. Here, surely, is a baker who has learned that citizenship, as well as dough troughs, pays.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

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JUNE 15, 1924

We Work Together

***To win through quality production
and the utilization of scientific research
a welcome for two loaves of wheaten
bread for every one that now finds favor.***

Going Up a Notch

WE HAVE heard much of the advance which has placed the Baking Industry SIXTH among all of the industries of the United States. We are often reminded of the vast difference between the modern bakery and the old fashioned bake shop. We are greatly impressed by the recognition of the American Institute of Baking in scientific circles as evidenced by such tributes as the presentation of the bust of Pasteur. But our thoughts this morning are of a vastly different nature.

We are in the midst of a trip which is bringing us into contact with bakers all over the country from the northern to the southern borders. We have also visited the national convention of an organization which includes manufacturers of every type and we can not help but be impressed by the remarkable developments in the personnel of the Baking Industry. It is not a case of the present generation surpassing those that have gone before, but we have

seen from year to year a remarkable improvement in the character, culture and refinement of those very same men who have been attending conventions in the past decade.

Large and small bakers alike have taken their place in the public life and in the demonstration of their belief in the corollary to the proposition of Rotary that "He profits most who serves best." There is a universal recognition of the fact that without service there is no real profit. Having seen, therefore, the representatives of the Baking Industry compare favorably with representatives of other industries as present at the aforementioned convention we can not help but face the future with bright hopes and courage for the still further development of our splendid industry which is playing so great a part in the future of civilization and the emancipation of the American Housewife from the kitchen oven.

RAYMOND K. STRITZINGER,
President.

Life Aims

IF YOU had been going west in the Pioneer days would you have been up at the front of your wagon train helping to roll the rocks out of the way, or would you have been a day or two back in the rear "because those ahead of me can't roll the road up behind them?" It is really painful to work in the National headquarters of an industry that needs contacts in Washington, yet does not half-way support the contact maker; that needs trained men, yet withholds help from the teacher; that must educate the consumer of its product, yet will not pay the cost of that education; that can develop only through scientific research, yet will not support the scientist as he applies himself in his laboratory; that must gain the spirit

of cooperation in order to accomplish team work, yet tends to fall apart through sectional, factional, and other form of pride and jealousy. A few hundred of bakers out of the many thousands who turn wheat into baked foods is too small a number to carry the burdens of breaking the trail for all. It surely is time that thousands learned the value of supporting their National organization instead of hundreds as is now the case.

A Burden to Lift

LIFE is so casually indifferent as to who wins her rewards and penalties that often the best deeds of a man stand forth only long after he has died. President Harding was buried beneath a burden carried to his grave by those whom he trusted while they busied themselves with things other than those on which his own great mind was fixed.

"The greatest single American industry," he once said in a revealing flash of his own mind, "is the management of the American home where twenty million women toil every day of the year, eighteen millions of these doing their own work without help. *We are going to have such advancement as will represent a real emancipation for these women.*"

Could any leader look with more sympathy upon the problem of the hour in American life? As bakers press forward in performing their part of this great task, they are assailed on all sides by ignorant persons who would use them spitefully and drive them back from the advances which have made much of women's emancipation possible. It is one of the misfortunes of the times that too many such persons are in governmental life, bureaucratically exercising authority without a sense of responsibility, and issuing wild statements on which wilder, by far, conclusions are

drawn by those who think it good politics to assail and belittle the baker. Our industry carries on, its members confident that in the end no woman will be fooled, and that better and better quality in bread will more and more fulfill the expectations of the Housewife as she gains new trenches in her Emancipation war.

Proving their Case

THE merits of scientific medicine were probably never shown with such an array of proofs to back them up as at the Municipal Pier, Chicago, during the week of June 9.

The American Medical Association met during this week, and while its 5,000 members present discussed clinical problems in convention halls, the lay public enlightened themselves in the exhibition rooms.

Scientific Medicine has had a valiant fight to make against necromancers and quacks. Therefore, a large part of the exhibit was given up to proofs that the quack had done nothing but take the public's money for fraudulent "cures."

One exhibit displayed original Pasteur flasks filled with his yeast cultures. Thus Pasteur was welcomed as the father of modern bacteriology as the surgeon knows it.

Some of the latest advances made through this new knowledge were startling. There was a bacterial culture, which if taken in the form of a fermented milk, would kill the existing bacteria of the intestinal tract and substitute that of the milk culture.

In this advance lies a fine opportunity for cooperation between the Baking Industry and the medical profession in the preparation of special breads for special medical needs. Many such needs were shown at the convention sessions.

One and the Same

WHEN the gospel of sanitation for bakeries first found expression in words its spokesmen were vigorously assailed and treated spitefully by many who should have comprehended what their words were meant to mean.

There still remain some few who would prevent the baking industry from progressing in the path every industry has followed which has reaped the rewards of community effort expended "to glorify the product and forget the brand." They have claimed there was nothing in common between the wholesale baker and the retail baker, and that each group must remain a group apart, with only hostility in between.

Milk producers once so believed. Now, as never before, they have joined in community advertising and co-operative advertising to promote good will towards milk. Ice cream makers have invaded the field once ruled by bread—with a product suitable for the recess sandwich and the after-school sandwich for the hungry child.

"The object of our co-operative campaign," says the Milk Plant Monthly, "is to disseminate through many sources true educational material regarding the value of ice cream as a part of the daily diet. The campaign has been so planned as to reach every person in the community, from the poor to the rich, from the young to the old, from the well to the sick. The appeal in picture and copy are directed mainly to women and children, because of their great influence on the family diet. Commencing early in August, ice cream manufacturers will unite in placing in every brick of ice cream a sterile celluloid card with one word upon it: 'Health.'"

That's the way the winds of united effort blow in another industry that was split into factions, each of which met in

bristling spirit against its fellows, whenever they met at all, until a very few years ago.

Imagine those ice cream manufacturers facing a faction of their industry, as the promoters of toast did, who repelled with bitterness their friendly overtures for co-operation as if the movement were a hostile one "from big men to overcome their smaller rivals."

In the Retail Baker, where bitter words against certain groups of bakers once were the common rule, we find these words of admonition to the industry, printed in May, 1924:

"Bread made with milk is the best sustenance known to us, and no effort should be spared to acquaint the public with the true facts. A fair price can always be received for a good product. If people find they can get a better and more nutritious loaf, experience has proved that they will gladly pay the necessary price advance."

Where is there a spokesman for any group of bakers who ever wants to gainsay this truth? Here the retail baker finds himself in exact accord with the biggest wholesaler, and the retailer's organ voices the cause that is the common cause of all. It is pleasant to record this evidence that progress is being made towards co-operation, and not towards that mood which sees evil in all done except by the observer's own group.

Joining On

Inclosed I am sending you a check for membership in our association. Mrs. Davis will be at Atlantic City and will represent this firm at the convention. If there is anything I can do in this locality for the good of the industry please advise me.

—E. A. Davis, Miami, Florida.

The Whole Loaf



One upon a time
There was a woman
Who loved
Beauty.
She longed to paint, to make fine music.
But her life was cast in other lines.
Disappointment embittered her soul.
"Shall I live forever in a dream of what I cannot be!" she said.
"Because my time must be given to homely tasks and the care of children, shall I never express beauty?"
She visited a gallery.
She saw a picture—a perfect thing.
Fruit arranged in a basket, and some garden flowers.
And near-by another—a quaint bowl of milk—a loaf of bread and a blue-eyed child.
"I have fruit, and a basket covered with dust," she said.
It was time to feed the Littlest Child.
He was blue-eyed.
There was a wholesome loaf.
On the top shelf was a quaint bowl.
She put it before him—filled with milk.
The scales fell from her eyes—
She had the Whole Loaf.

—Mrs. Ida Bailey Allen

Each Man and His Neighbor

Herbert Hoover Raises Question As to Whether They Can Get On Together or Must be Bossed by Government

HAVE you, Mr. Baker, in common with every other man in America, noticed the enormous tendency of government bureaus to feed upon themselves and swell up, since the World War? Have you noticed the increasing vexatiousness with which intruding inspectors of about everything in the world come to look over every activity of every business man?

Is this movement merely a raid of "the political boys" to affix themselves on industry and get a living for the largest possible number of them, or are there business sins that must be attended to by government intermeddlers?

Finding out the answer concerns every man in any business. Herbert Hoover wants to find it. He has laid down the case for the consideration of American business men. Among these business men the bakers are included. As Alex Taggart put it, "I find every day that government must be my business as much as the affairs of my office are, that tariff is business, that express rates are business, that regulative laws are business. I must join with my fellows in my industry to study, to know these factors before I can properly conduct my business."

Senator Beveridge arose recently to declare that there is one government agent now for every sixteen members of the population—almost as many government agents buzzing around, trying to lay down rules and regulations for this and that—as there are automobiles in America.

Can Business, through new standards of conduct, built to fit the times, hold control of the very enterprises Business has built? Or will the control pass over into other hands? Here is Mr. Hoover's issue

as placed by him before the United States Chamber of Commerce. It is printed here for bakers' study.

THE advancement of science and our increasing population require constantly new standards of conduct and breed an increasing multitude of new rules and regulations. The basic principles laid down in the Ten Commandments and the Sermon on the Mount are as applicable today as when they were declared, but they require a host of subsidiary clauses. The ten ways to evil in the time of Moses have increased to ten thousand now.

A whole host of rules and regulations are necessary to maintain human rights with this amazing transformation into an industrial era. Ten people in a whole county, with a plow apiece, did not elbow each other very much. But when we put seven million people in a county with the tools, electricity, steam, 30-floor buildings, telephones, miscellaneous noises, street cars, railways, motors, stock exchanges, and what not, then we do jostle each other in a multitude of directions.

Thereupon our law makers supply the demand by the ceaseless piling up of statutes in attempts to keep the traffic open; to assure fair dealing in the economic world, to eliminate its wastes, to prevent some kind of abuse or some kind of domination. Moreover, with increasing education, our senses become more offended and our moral discriminations increase; for all of which we discover new things to remedy. **In one of our States over 1,000 laws and ordinances have been added in the last eight months.** It is also true that a large part of them will sleep peacefully in the statute book.

The question we need to consider is whether these rules and regulations are to be developed solely by Government or whether they can not be in some large part developed out of voluntary forces in the nation. In other words, can the abuses which give rise to Government in business be eliminated by the systematic and voluntary action of commerce and industry itself? This is indeed the thought behind the whole gamut of recent slogans, "Less Government in Business," "Less Government Regulations," "A Square Deal," "The Elimination of Waste," "Better Business Ethics," and a dozen others.

Monopoly and Waste

No one disputes the necessity for constantly new standards of conduct in relation to all these tools and inventions. Even our latest great invention—radio—has brought a host of new questions. No one disputes that much of these subsidiary additions to the Ten Commandments must be made by legislation. Our public utilities are wasteful and costly unless we give them a privilege more or less monopolistic. At once when we have business affected with monopoly we must have regulation by law. Much of even this phase might have been unnecessary had there been a higher degree of responsibility to the public, higher standards of business practice among those who dominated these agencies in years gone by.

There has been, however, a great extension of Government regulation and control beyond the field of public utilities into the fields of production and distribution of commodities and credit. When legislation penetrates the business world it is because there is abuse somewhere. **A great deal of this legislation is due rather to the inability of business hitherto so organize as to correct abuses than to any lack of desire to have it done.**

Some times the abuses are more apparent than real, but anything is a handle for demagoguery. **In the main, however, the public acts only when it has lost confidence in the inability or willingness of business to correct its own abuses.**

Legislative action is always clumsy—it is incapable of adjustment to shifting needs. It often enough produces new economic currents more abusive than those intended to be cured. Government, too, often becomes the persecutor instead of the regulator.

The vast tide of these regulations that is sweeping onward can be stopped if it is possible to devise, out of the conscience and organization of business itself, those restraints which will cure abuse; that will eliminate waste; that will prevent unnecessary hardship in the working of our economic system; that will march without larger social understanding. Indeed, it is vitally necessary that we stem this tide if we would preserve that initiative in men which builds up the character, intelligence, and progress in our people.

Industry Must Serve

In these times of muddled thought it is sometimes worth repeating a truism. Industry and commerce are not based upon taking advantage of other persons. Their foundations lie in the division of labor and exchange of products. For through specialization we increase the total and variety of production and secure its diffusion into consumption. By some false analogy to the "survival of the fittest" many have conceived the whole business world to be a sort of economic "dog eat dog." We often lay too much emphasis upon its competitive features, too little upon the fact that it is in essence a great co-operative effort. And our home-made Bolshevik-minded critics to the contrary, the whole economic structure of our nation and the survival of

our high general levels of comfort are dependent upon the maintenance and development of leadership in the world of industry and commerce.

Any contribution to larger production, to greater diffusion of things consumable and enjoyable, is a service to the community and the men who honestly accomplish it deserve high public esteem.

The thing we all need searchingly to consider is the practical question of the method by which the business world can develop and enforce its own standards and thus stem the tide of Governmental regulation. The cure does not lie in mere opposition. It lies in the correction of abuse.

The problem of business ethics, as a prevention of abuse, is of two categories: those where the standard must be one of individual moral perceptions, and those where we must have a determination of standards of conduct for a whole group in order that there may be a basis of ethics.

Government Regulations

If we are to find a solution to these collective issues outside of Government regulation we must meet two practical problems:

First, there must be organization in such form as can establish the standards of conduct in this vast complex of shifting invention, production, and use. There is no existing basis to check the failure of service or the sacrifice of public interest. Some one must determine such standards. They must be determined and held flexibly in tune with the intense technology of trade.

Second, There must be some sort of enforcement. There is the perpetual difficulty of a small minority who will not play the game. They too often bring disrepute upon the vast majority; they drive many others to adopt unfair competitive methods which they deplore; their

abuses give rise to public indignation and clamor which breed legislative action.

I believe we now for the first time have the method at hand for voluntarily organized determination of standards and their adoption. I would go further; I believe we are in the presence of a new era in the organization of industry and commerce in which, if properly directed, lie forces pregnant with infinite possibilities of moral progress. **I believe that we are, almost unnoticed, in the midst of a great revolution—or perhaps a better word, a transformation in the whole super-organization of our economic life.** We are passing from a period of extremely individualistic action into a period of associational activities.

Practically our entire American working world is now organized into some sort or form of economic association. We have trade associations and trade institutes embracing particular industries and occupations. We have chambers of commerce embracing representatives of different industries and commerce. We have the labor unions representing the different crafts. We have associations embracing all the different professions—law, engineering, medicine, banking, real estate, and what-not.

The Newer Organization

It is true that these associations exist for varied purposes. Some are strong in recognition of public responsibility and large in vision. Some are selfish and narrow. But they all represent a vast ferment of economic striving and change.

Associational activities are, I believe, driving upon a new road where the objectives can be made wholly and vitally of public interest. The legitimate trade associations, with which I am now primarily concerned, possess certain characteristics of social importance and the widest differentiation from pools and trusts. Their membership must be open

to all members in the industry or trade, or rival organizations enter the field at once. Therefore, they are not millstones for the grinding of competitors, as was the essence of the old trade combinations. **Their purpose must be the advancement of the whole industry or trade, or they can not hold together. The total interdependence of all industries and commerce compels them in the long run to go parallel to the general economic good.** Their leaders rise in a real democracy without bosses or political manipulation. Citizens can not run away from their country if they do not like the political management, but members of voluntary associations can resign and the associations die.

I believe that through these forces we are slowly moving toward some sort of industrial democracy. We are upon its threshold, if these agencies can be directed solely to constructive performance in the public interest.

Standards are Essential

All this does contain some dangers, but they will come only from low ethical standards. With these agencies used as the machinery for the cultivation and spread of high standards and the elimination of abuses, I am convinced that we shall have entered the great era of self-governing industry and business which has been a dream to many thinkers. A self-governing industry can be made to render needless vast area of Governmental interference and regulation which has grown up out of righteous complaint against the abuses during the birth pains of an industrial world.

Some people have been alarmed lest this associational movement means the destruction of our competitive system, lest it inevitably destroy the primary individualism which is the impulse of our society. This alarm is groundless. Its

rightful activities do not destroy equality of opportunity or initiative. In fact, they offer new avenues of opportunity for individuals to make progress toward leadership in the community. Anyone of them will die at once if it does not offer equality of opportunity to its members; or if it restricts its membership, rival associations at once emerge. They are the safeguards of small business and thus prevent the extinction of competition. They are the alternative to capital consolidation. They are not a growth toward socialism—that is Government in all business—they are in fact a growth directly away from such an idea.

The Porch Climbers

Right here for the benefit of the gloomy persons who have a frozen belief that every form of associational activity is a conspiracy to fix prices and to restrain trade to perpetuate tyranny of employer and employee, we may remember that there are some crooks in every line of endeavor. The underlying purposes of the vast majority are constructive. A minority may be violating the Ten Commandments and need the application of criminal standards. I am speaking, however, of something more vital than porch climbing.

I am, of course, well aware of the legal difficulties that surround certain types of associational work. I do not believe that the development of standards of conduct or the elimination of abuses in public interest has ever been challenged as a violation of the Sherman Act. Moreover, to establish either a physical or a moral standard directly sharpens competition.

These associational activities are the promising machinery for much of the necessary determination of ethical standards, for the elimination of useless waste and hardship from the burden of our economic engines. Moreover, we have in

them not only the agencies by which standards can be set, but by co-operative action among the associations representing the different stages of production, distribution and use we can secure a degree of enforcement far wider than mere public opinion in a single trade.

Publication of Codes

I could give you a multitude of examples of the beginnings of constructive self-government in industry among many associations. The very publication of codes of ethics by many associations instilling service as the primary purpose; the condemnation of specific unfair practices; the insistence upon a higher plane of relationships between employer and employee—all of them are at least indications of improving thought and growing moral perceptions.

All of this is the strong beginning of a new force in the business world. The individual interest is wrapped up with public interest. They can find expression only through association. Three years of study and intimate contact with associations of economic groups whether in production, distribution, labor or finance, convince me that there lies within them a great moving impulse toward betterment.

If these organizations accept as their primary purpose the lifting of standards, if they will co-operate together for voluntary enforcement of high standards, we shall have proceeded far along the road of the elimination of government from business. **American business is never secure unless it has public confidence behind it.** Otherwise it will always be a prey to demagoguery and filled with discouragement.

The test of our whole economic and social system is its capacity to cure its own abuses. New abuses and new relationships to the public interest will occur as long as we continue to progress. If

we are to be wholly dependent upon Government to cure these abuses we shall by this very method have created an enlarged and deadening abuse through the extension of bureaucracy and the clumsy and incapable handling of delicate economic forces. The old law merchant is the basis of much of our common law. A renaissance of new spirit of service could so advance our standards as to solve much of the problem of Government in business.

American business needs a lifting purpose greater than the struggle of materialism. Nor can it lie in some evanescent, emotional, dramatic crusade. **It lies in the higher pitch of economic life, in a finer regard for the rights of others, a stronger devotion to obligations of citizenship that will assure an improved leadership in every community and the nation;** it lies in the organization of the forces of our economic life so that they may produce happier individual lives, more secure in employment and comfort, larger in the possibilities of enjoyment of nature, larger in its opportunities of intellectual life. Our people have already shown a higher sense of responsibilities in these things than those of any other country. The ferment of organization for more definite accomplishment of these things in the practical day-to-day progress of business life is alive in our business world.

The Government can best contribute through stimulation of and co-operation with voluntary forces in our national life; for we thus preserve the foundations upon which we have progressed so far the initiative of our people. With vision and devotion these voluntary forces can accomplish more for America than any spread of the hand of the Government.

P. S. Can any baker finish reading the above view of Hoover, without feeling he is right in building up his National organization and passing this magazine on to a

brother who does not yet believe that joining would return a profit?

A Growing Bread Outlet

HERE is something for bakers to be watchful about: take notice constantly of those lengthening queues of people in front of cafeterias at dinner time. Note that mother now holds little Johnny by the hand and that Sister comes along with her doll on her arms. Father is there to pay the bill. Get acquainted with your restaurant men and you will find this is no mere accident. They have a National association and they really support it. One of its concentrated drives is against the home dinner table.

"Mother deserves a meal out," is a sort of a slogan it is working up, and the slogan does not end with the advertising department and the publicity men. It has worked itself in the form of a gospel for restaurant service. The idea is to make the meal so good and so moderate in cost that the family unit will want to come again—as a family unit.

This may mean much to home bread consumption, especially in the great cities. The wise baker may be the one who seeks the cafeteria trade and holds it with the best bread he can bake when he gets it. Families which eat out quite often seem enormously on the increase, and the lure for them is being set with constant skillfulness by the restaurateurs. They have a Code of Ethics of their own which is held up as an ideal for each to strive towards.

"We are so happy over our progress and over our Code," writes A. B. Carder, general secretary of the National Restaurant Association, with offices at 1115 Walnut Street, Kansas City, Mo., "that we are like the little boy with the new toy; we can't help showing it around." And with that he sent us a copy of the

restaurant men's code. It pledges them to **sanitary** restaurants without force from Health Department inspectors, just as the wise baker invites the public and the inspectors rather than locking his doors against them and concealing dirt he had better be without.

A School for Salesmen

WITH the baker's own salesmen and the grocer and his clerks standing, often, between the baker and the consumer who is either going to "make or break" him by her confidence, or lack of it, in his bread, no baker can work too hard to get the story of his production over into the housewife's dining room.

Schools for salesmanship are not to be looked on lightly. Some bakers invite large numbers of grocers to their shops at regular intervals. Others take infinite pains with their salesmen. To make sure that the salesmen of Consumers Bread Co., Kansas City, know the story of the bread they sell, that company operates its own school for salesmen. As described in *Bakers Weekly*, the school is one in which each salesman in turn has to act the part of the grocer while another "sells" him on Consumers' bread. The result, of course, is that the best ideas developed by any one salesman become the common practice of the company's men and each takes the keen interest in his job that comes from knowing what it's about and that the company is glad to see him do well.

I was very much impressed with your technical school, both as to its equipment and the circulars which it has put out. Upon my return to Scotland, I described its work to our managing director and he was quite taken with it.

—John Morton,

Director William Beattie, Ltd., Glasgow, Scotland.

Science and the Weight Laws

How Laboratory Tests for Moisture Content Could Serve as Scientific Basis for Legal Weight Determinations

By DR. H. E. BARNARD*

Director, American Institute of Baking

IN HIS first annual message to Congress, President Washington said, "Uniformity in the currency, weights and measures of the United States is an object of great importance." In his second message he again referred to this subject, and in his third annual message he said, "Uniformity in the weights and measures of the country is among the important objects submitted to you in the constitution and if it can be derived from a standard at once invariable and universal, must be no less honorable to the public councils than conducive to the public convenience."

Nearly 150 years have elapsed since Washington first brought the subject of weights and measures to the attention of Congress, and today we are still considering the matter. It is true that we now have official standards, but those are for the most part standards established by state legislatures, for while Congress delayed action year after year, in order to facilitate commerce, the states themselves were compelled to set up the standards essential to the transaction of business.

The standards adopted independently of the Government and of each other varied widely. In 1830, the Senate directed the Secretary of the Treasury to compare the weights and measures in use at the principal custom houses. This investigation disclosed wide discrepancies between the standards, and without waiting for further authority from Congress, the Treasury Department took immediate

steps to correct unsatisfactory conditions by adopting definite standards.

In 1836, Congress instructed the Secretary of the Treasury to deliver to each state a complete set of the new standard weights and measures, and in the course of years most of the states adopted these standards as their own.

These standards were adopted almost 100 years ago, but Congress is still discussing the enactment of adequate weights and measures legislation,* and bills are still being introduced to standardize certain commodities. The astonishing thing about the whole subject is that in spite of varying standards and inadequate legislation, commerce and industry is carried on as successfully as it is.

In the address made by Commissioner Miller,¹ of Indiana, at the 18th annual conference of weights and measures, he pointed out certain absurdities which exist in weights and measures legislation. The variations and discrepancies in the number of pounds required to make a legal bushel in the case of well known commodities still frequently sold by the bushel measure, are most interesting.

Fixing of Weights

He says, for instance, that while "forty-four states fixed a bushel weight of potatoes at sixty pounds, yet North Carolina has seen fit to break the rule by requiring only fifty-six pounds. Twenty states have standardized the bushel of Red Top Grass Seed at fourteen pounds, but Virginia insists upon forty pounds or nearly three times the customary standard. The bushel of spinach has been variously

* In an address before annual conference, Weights and Measures Officials, at Washington, D. C., May 26-29, 1924.

standardized at ten, twelve, and thirty pounds. Salt has been standardized at fifty, fifty-five, and fifty-six, sixty, sixty-two, seventy, eighty and eighty-five pounds to the bushel. A bushel of fine salt in Indiana is fifty-five pounds and of coarse salt fifty pounds, but exactly the reverse is found in the adjoining state of Illinois. Ten pounds of kale are required for a bushel in North Carolina, twelve pounds in Maine and Massachusetts and thirty pounds in South Carolina and Tennessee.

Evidently but few bushel weights have been established through experimental or scientific investigation.

Great alarm would occur and much injury result to commerce should some of the states attempt to reduce or increase the length of the yard, or increase the standard avoirdupois pound, yet the states have continued to establish by legislation new bushel weight standards, until the whole system is a hodge-podge. It is no more absurd to say that the yard shall be thirty-five inches in Texas and thirty-six inches in Oklahoma, than it is to say that a bushel of plums shall weigh twenty-eight pounds in Michigan and fifty pounds in Ohio, or that rye shall consist of thirty-two pounds in Louisiana and fifty-six pounds in Florida, yet scores of such absurdities are revealed by the tables to which reference has been made.

Is it not high time for legislators to pause from their labors and to consider whether or not in setting up legislation affecting the weights and measures of commodities, some true scientific basis may be found upon which to base proposed and desirable legislation?

I have pointed out wide discrepancies between the weights of bushels of certain commodities. May I now bring to your attention the fact that even if the bushel weights of commodities were the same in all the states, the enforcement of weights

and measures legislation would still be illogical and unsound if other conditions than the cubical content of the bushel and the weight of the materials contained therein are not set up.

In many states a bushel of corn weighs 70 pounds before the first of December and 68 pounds thereafter. This difference in the weight of the bushel was undoubtedly a recognition by the legislators of the fact that corn on the ear lost weight in storage. What is true of corn is true of a great variety of substances. Indeed, this statement may be applied to almost every commodity which contains water as an essential constituent or which is hygroscopic in character.

As to a Ton of Hay

What, for instance, is a ton of hay? Is it 2,000 pounds of hay air dried in the field, stored in the mow, or baled into convenient packages? What is a ton of coke? It is 2,000 pounds, to be sure, but how much water should the coke contain? What does the customer get when he purchases fifty pounds of raisins or dried apples, or of any other dried fruit? If he lives in New Orleans he gets a definite quantity, 50 pounds to be sure. He gets the same weight in Denver, but he certainly does not get in any case the same amount of food, for the moisture content of all dried fruits varies directly with temperature and humidity conditions. In a personal communication from the Department of Agriculture of one of the western states, the chemist says, "In the case of raisins and dried fruit the variation in weight has been found to be large owing to the fact that such products are often retained on the grocer's shelves for a considerable length of time. If the product as originally packed contains a considerable amount of water, the shrinkage would be as much as 15 to 20 per cent in weight."

In an endeavor to secure data showing the usual practice in the enforcement of weights and measures legislation, I have recently asked the weights and measures officials of the country for information covering this subject. I regret that very little data on the subject of the change of moisture content under varying temperatures and humidity conditions is obtainable and I am forced to conclude that in the enforcement of weights and measure laws the purpose is not so much to determine the amount of food sold the consumer as the actual weights of the product at the time of delivery.

The consumer is therefore offered but a partial protecting in his desire to know just what he is getting for his dollar.

Flour and Humidity

Flour is usually thought of as a stable product. This is far from the case. Some forty years ago Clifford Richardson,³ then an investigator of the Division of Chemistry of the Department of Agriculture, studied the weight of flour with respect to the relative humidity of the air. He exposed five lots of flour for eighteen days and made at intervals fifteen moisture tests on each flour. The flours varied in moisture content when the test began, from 7.80 per cent to 13.68 per cent. The flour was exposed in a room with free access to the air but protected by a screen from other influences than air.

The tests showed that the weight of the flour was dependent upon the relative humidity of the air. During the 18 days the relative humidity of the air varied from 34, the lowest, to 66.9, the highest. Taking 100 pounds as the weight at the commencement of the test, the weight of one sample, for instance, was 99.88 pounds when the humidity of the air was at 34, and 102.88 pounds when the humidity stood at 66.9. The gain in one sample of flour at the end of the test, when the

humidity was 66.9, was 5.95 pounds or 5.95 per cent. Others gained less, but all gained except the one with the 12.68 per cent of moisture, which weighed 99.35 pounds, having lost .65 of 1 per cent in the 18 days. All the flours except this last were exceptionally small in moisture content, while this one sample was unusually large in moisture content.

The tests conclusively showed that flour will take on and part with moisture as the humidity of the air rises and falls.

J. T. Willard, analyst for the Kansas State Board of Health,² in 1911, studied the variation in moisture content of sacked flour. In the experiment 27 $\frac{1}{4}$ -barrel sacks were piled as closely together as possible in three layers of nine sacks, each in an airy room, which during the winter months was heated to ordinary room temperature. Each of the sacks was weighed monthly for a period of twelve months. Very little loss was observed during the first two months. When the room was heated during the winter there was a steady loss which, however, was in part made up by slight gains during the summer months. At the end of the period during which the room was heated, the average loss was 0.79 pounds per 49 pound sack.

The results of these experiments have been confirmed thousands of times by millers and by flour buyers who have noted decided difference in the weight of flour on arrival from the weight when shipped. In the enforcement of the Food and Drugs Act many cases have been filed against millers for shipping short weight flour. In some cases there has been no doubt as to the guilt of the miller, but in other cases the shortage was undoubtedly due to the loss of moisture during the period which elapsed between the packing of the flour and its weighing by the customer and inspector.

The tendency of flour to take on and

lose moisture has recently been studied by C. H. Bailey,⁴ who, in a paper on "The Hygroscopic Moisture of Flour Exposed to Atmospheres of Different Relative Humidity," shows conclusively that flour responds readily to changes in the humidity of the surrounding air, the rate at which equilibrium in moisture content is approached depending apparently upon conditions of exposure. The author quotes other investigators, including Willard,² Neumann,⁵ Guthrie and Norris,⁶ Sanderson,⁷ Swanson, Willard and Fritz,⁸ and Stockham,⁹ who have studied the changes in weight and moisture content of stored bread.

Some idea of the variation in moisture content of flour milled from different varieties of wheat in different sections of the country is shown by the figures below which are averages of some 800 cars of flour shipped during the first four months of this year.

Firm Shown by Number	Average Moisture Content		
	Lowest	Highest	Average
1	10.36	13.52	11.46
2	9.56	13.40	10.78
3	11.30	13.29	12.31
4	10.48	12.68	11.83
5	9.87	12.28	10.80
6	9.44	11.70	10.38
7	11.34	13.52	12.61
8	10.53	12.31	11.41

The wide ranges in the moisture content of these flours, though they were milled under carefully controlled conditions, show most definitely the need for taking the moisture content of flour into consideration when determining flour weights. To fail to do so introduces the element of guesswork into the transaction. Fluctuating moisture contents have exactly the same effect on business as fluctuating money values or unstabilized exchange.

Stockham⁹ reports the moisture content of wheat, bran, shorts, and flour exposed in a "saturated" and "dry" atmosphere, but he did not employ any degrees of atmospheric humidity between

these extremes. He found that a composite sample of flour exposed in a "still, saturated" atmosphere at a temperature of 23° C. reached a maximum moisture content of 28.74 per cent in 9.12 days, at which time it was moldy. In a saturated atmosphere at 0° a moisture content of 34.78 per cent was reached in 17 days, which he states was not the maximum.

Schollenberger,¹⁰ in Bulletin No. 1013 of the U. S. Department of Agriculture, refers to the "well-known fact that the normal moisture content of air-dry wheat is higher when stored in moist climates than when stored in dry climates." The author further defines the term "normal" as that point at which equilibrium is established between the moisture content of the wheat and the humidity of the air.

North Dakota Experiment Station,¹¹ Bulletin No. 120, 1917, on the capacity of wheat and mill products for moisture, says in part, "One of the well known relationships of the moisture content of wheat is its approximate parallelism to the humidity of the atmosphere. The moisture problem would be relatively simple if all samples responded the same under like conditions, but unfortunately they do not, as they differ in their rate of change, or natural capacity. The capacity of wheat and its products for atmospheric moisture and water increases as the physical equilibrium between the component particles is approached."

Corn's Weight Losses

Shelled corn loses weight in storage. In experiments conducted by the Office of Grain Standardization, U. S. Dept. of Agriculture, corn held in the hopper of an elevator scale for 147 days lost 5.6%. J. W. T. Duvel and Laurel Duvel,¹² in U. S. Dept. Agri. Bull. 48, 1913, commenting on these tests say in part, "There is unquestionably a natural shrinkage in commercial corn during transit and while in

storage which varies with the moisture content of the corn and the atmospheric conditions to which it is exposed."

In a personal communication from the Bureau of Plant Industry of the U. S. Department of Agriculture, my correspondent points out that "there is a loss in weight of apples, corn, hay, etc., when held in storage. This is due, to a large extent, to the loss of water. At the same time in many fruits and vegetables which are alive in storage there are changes, mostly catabolic, which take place more or less rapidly according to the character of the product or temperature at which it is held. The changes according to Van't Hoff are doubled or trebled with each ten degrees rise in centigrade. There are, of course, a great many changes in the physical conditions which are progressive and which are apparently influenced by the temperature conditions."

Bread as commercially sold today is either manufactured in standard sizes or sold under a declaration of its weight. It is probable that no food commodity on the market is so subject to fluctuations in weight as is bread. This is due to the fact that the moisture content of freshly baked bread is high, as well as to its composition which is so largely starch, itself very hygroscopic.

In an address made to the Weights and Measures Officials of Indiana at their 1924 Conference,¹³ which was later printed in *Baking Technology*, I showed the loss of moisture in commercial bread baked and analyzed at the laboratories of American Institute of Baking, after having been exposed to the usual temperature and humidity conditions of the room. The average moisture content of the bread one hour after baking of a series of 13 loaves which were exposed unwrapped, was 36.23%; 24 hours after baking the moisture content was 29.20%; 48 hours after baking the average moisture content

was 24.93%; 72 hours after baking the average moisture content was 21.59%.

Similar studies were made of the loss in weight of different types of bread made with varying amounts of water, that is, with flour of varying absorption. The average loss in 24 hours of unwrapped bread varied from 1.03 to 1.53 ounces.

Bread wrapped in paraffin paper lost very little moisture. When heavily waxed paper was used the loss in 24 hours' time of a 17 ounce loaf was but .41 ounce. When wrapped in paper with a less dense paraffin coat, the loss was approximately twice as high, or .82 ounce.

Bread Weight Losses

From unpublished data furnished me by the chemist of a large bakery organization, I quote the following figures. Loaves made from a lean formula, that is, containing no shortening or sweetened condensed milk, contained when taken from the oven an average moisture content of 42.91%, 72 hours later at the conclusion of the experiment contained but 34.97% of moisture, a loss of 7.94%.

The average weight of the loaves when taken from the oven was 768.5 grams. At the conclusion of the experiment the average weight was 674.5 grams.

Similar studies made on bread with a rich formula containing 7% of sweetened condensed milk and from 2 to 3 per cent of shortening, showed an average moisture content on the freshly baked bread of 41%, whereas 72 hours later at the end of the experiment the moisture content was but 33.08%, a loss of 7.92% of moisture. The average weight of these loaves when freshly baked was 806 grams. At the conclusion of the experiment the average weight was 710.5 grams.

But whatever the condition or weight of the bread (and this statement is true of all food stuffs which gain or lose in weight under varying conditions of humidity and temperature) the change in

weight is always due to loss or gain in water content. There is no change in the content of the food ingredients. A loaf of bread containing 38% of water and weighing 16 ounces will contain just as much food for the maintenance of bodily efficiency after its moisture content has been reduced to 20%, to 10%, or to 0. The fuel value of a ton of coke is determined, not by the weight of the coke but by the weight of the moisture-free matter. This is not entirely a true statement, for in the case of fuels containing water a certain number of British thermal units will be consumed in evaporating the moisture content. When, however, foods are burned in human metabolism it is not necessary to take this fact into account. The only point which interests us is the absolute quantity of food obtained.

Even the few illustrations I have cited, of scores I might lay before you, are sufficient to sustain the belief that the present method of enforcing weights and measures legislation is not in accord with Washington's expression which I have already quoted, and in which he points out the importance of uniform weights and measures "derived from a standard at once invariable and universal." It is obvious that our present method of determining quantities of commodities by the scale without at the same time taking into account their moisture content, is not such a standard. It is equally obvious that laws and regulations governing the scale of commodities by weight which do not recognize the hygroscopic character of most food commodities cannot be enforced except to the disadvantage of the buyer or seller, or both.

Can we longer ignore the obvious fact that the real value of food commodities is not determined by measure or weight but by number of food units sold? The moisture or water in the commodity in question increases the weight and usually

the bulk, but it does not in the slightest degree add to the nutritive value.

The point may well be made that unless foods or other commodities have a recognized moisture content, it will not be possible to establish a standard by which the quantity in question may be measured. This is true. It would indeed be impractical to say that the weight of flour, of raisins, of coke, of butter, of bread, should be determined by adding to the weight of the moisture free substance a definite moisture content unless such a moisture content had been determined and fixed, either by universal custom or by legislative enactment. Fortunately, such moisture standards are recognized in the case of many commodities.

Moisture in Butter

The moisture standard of butter is fixed at 16%, of flour at 13.5%, of bread at 38%, of No. 1 hard red spring wheat at 14%, grade No. 5 hard red spring wheat 16%, grade No. 1 hard red winter wheat 13.5%, while grade No. 5 of the same type of wheat is set at 15.5%.

The moisture content of Grade No. 1 shelled corn is 14% while the sixth grade of the same corn may contain up to 23%. The moisture content of grades 1, 2, and 3 oats shall not exceed 12½%, while grade No. 4 shall not exceed 16%.

The Bureau of Markets of the U. S. Department of Agriculture is charged with the grading of wheat, shelled corn and oats, according to the Official Grain Standards of the United States. At the present time the Government maintains 36 supervision stations and 190 inspection stations for the testing of these grains, and approximately 450 inspectors are employed in enforcing the grain standards act. In 1923 these inspectors tested 2,000,000,000 bushels of grain, making some 1,400,000 inspections. Of this great number of inspections, some 400,000 inspections were of corn and in-

cluded the determination of the moisture in the sample. This work, which is being carried on so successfully by the Federal Government, is an outstanding example of the recognition of the fact that the moisture content of commodities subject to inspection must be taken into consideration.

Three groups of men are anxiously awaiting the conclusions of the Bureau of Standards—the group which deals in commodities which fluctuate in weight under varying temperature and humidity conditions; the group of scientists and technologists which recognizes the necessity for correct standards based on a scientific foundation, and the group of officials charged with the enforcement of weights and measures legislation.

I have, I trust, pointed out the interest and concern of the first group, and laid, though briefly, the foundation for my argument on behalf of the scientific world. I have not discussed as yet the practicability of improving the present methods of law enforcement so that the actual weights of products at the time of manufacture may be determined by adding to the moisture free content the recognized or legal moisture content.

Laboratory For Inspectors

It has been pointed out to me by inspectors of weights and measures that it is impractical for them to complicate their work by introducing a technique which requires the services of a laboratory. Some officials have advised me that while they recognize the desirability of improving on present methods of work, they do not have the funds with which to equip laboratories or employ chemists. Other inspectors have said that their work would be handicapped and the progress of justice delayed by any requirement of laboratory service of scientific study. These arguments or excuses, for they cannot be more than that, must, I believe, fall

before the facts and the established practices already in vogue. In the prosecution of cases involving the sale of skimmed or watered milk the inspector no longer presents his evidence backed by only the hydrometric report showing the specific gravity of the sample in question. His testimony is fortified by the testimony of the chemist who has determined the exact fat content of the milk.

Grain Grade Determinations

The grades of grain are no longer determined by taking the weight per bushel and separating the dockage. Every sample goes to the laboratory where its moisture content is accurately determined. The final grading, therefore, is, in the case of wheat, based upon the minimum test weight per bushel, the moisture content, the percentage of damaged kernels, the amount of foreign material other than dockage, and the presence of wheat of other classes.

If, in the enforcement of the U. S. Grain Standard Act, it is necessary to determine in the case of every sample the exact moisture content before the grade of the grain under investigation can be fixed, may it not be equally practicable to determine the moisture content of other commodities subject to inspection? It may be argued that there is no rapid method for the determination of the moisture content of dried fruits, of flour, of bread, of butter, of coke, and that the wheels of justice should not be delayed to permit the use of the present slow methods of moisture determination. Is it not probable that when the need arises, rapid methods of work will be devised?

The butter fat content of milk is no longer determined by extracting the fat with solvents. The Babcock Milk Tester now makes it possible to determine the fat content of milk in a few moments. The officials who enforce the grain standards no longer determine the moisture

content of grains by slowly drying out the moisture in a vacuum oven. The Brown Duval Moisture Tester has been fitted to the use of the inspector so that his work may be carried on rapidly and accurately.

Whenever a need arises in industry the need is met. This is just as true in science. And can we not go further and hope that when cities, states and nations recognize the fact that the enforcement of weights and measures regulations rest upon the application of science rather than upon the appointment of politicians to a minor office, we will have lifted into its proper place the whole work of the inspector of weights and measures. We shall dignify the service, remove it from the realm of practical politics and place it in the hands of scientifically trained inspectors, adequately equipped with laboratory facilities for the accurate application of the laws of physics and chemistry to the regulation of commerce.

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Pasteur in Industry

MY introduction to Pasteur and his work was, of course, through the medical side of it and I have been amazed through my years of medical and editorial work to observe how little appreciation there is of the industrial and commercial value of Pasteur discoveries. In fact, when I began preparing a popular talk on this subject several years ago I was unable to find any satisfactory material on the industrial value of bacteriology. Even such men as Jordan of the University of Chicago, Rosenau of Harvard, and McCoy of the Hygienic Laboratory were unable to furnish me with satisfactory data on this point. I am especially interested in the plan to erect a bust of Pasteur at the American Institute.

—Frederick R. Green, editor of Health.

On the Coast

The East Bay Retail Bakers' Association are having a great outdoor picnic today celebrating the end of Bread Week. They have heard about the work of the American Institute in their paper, the California Bakers News, and all agree that you are hitting the nail on the head. More power to the Institute.

—Frank C. Balbo, San Francisco.

Invalidates Container Act

Court of Appeals Reverses Decisions of Lower Courts on Important Texas Statute

IN THE effort to protect the consumer and control unfair competition, laws are constantly being enacted which propose to establish the conditions under which industry may operate. Such a law was passed by the 38th Legislature of the State of Texas.

The Act, known as the Net Container Act, was "designed to protect purchasers of any commodity within its provisions against deception as to the quantity or amount of the commodity purchased." The specific requirement of the Act was that all food stuffs sold in package form must be plainly and conspicuously marked on the outside of the package as to the quantity of the contents contained therein.

The case which brought about the overthrow of the Act involved the sale by a flour miller of a 48 pound sack of flour which at the time of sale by the miller to his grocer weighed 47 lbs. and 9 oz., in other words, while the sack was labeled "48 pounds net weight" it actually contained 7 ounces less than the stated amount.

The testimony showed that when the flour was packed on January 2, 1924, the sack contained exactly 48 pounds net, whereas when it was delivered from the warehouse 23 days later it had lost weight, and so under the law was illegal.

In handing down the decision reversing the judgment of the lower courts, Judge Lattimore of the Court of Appeals said:

"We first ask ourselves if this Law be capable of enforcement in consonance with the right and fair conduct of the business of those who make and sell food and food stuffs in this state and without confiscation of property consisting of unnecessary time and labor.

"We see nothing herein calling for a dis-

cussion of the extent of the police power as applicable hereto. Neither the public health, safety or morals are involved. Stated succinctly, the question is whether the makers and sellers of flour, meal, rice, peas, beans, dried fruits, cereals, etc., such as are ordinarily sold in packages and sacks, and which are within common knowledge subject to variations in weight, dependent on climatic and atmospheric conditions, can be penalized for selling, offering or exposing for sale such articles in packages when the net weight of the package is not plainly and accurately marked thereon.

"The facts in this case show that the correct weight of the sack of flour was plainly marked on the sack when put up by the miller on January 2, 1924. The amount of moisture content was then 13½%, same being within the Federal limitation for such content. Said sack was kept twenty-three days in a dry warehouse and sold. Its moisture content by ordinary evaporation had diminished 1%. Its weight was 7 ounces less when sold. Its food value, however, was unchanged. It is manifest that each day of the twenty-three during which the sack was in the warehouse, there was a change, however slight, in the weight of said sack of flour. Within limits peculiar to flour such weight would increase or diminish each day as the surrounding atmosphere be wet or dry. This announcement involves no legal principle and is but the statement of a fact established by science and known to all men. What we have said of flour would seem to apply to all articles of food and feed stuffs put up and sold in packages not air tight; and to attempt to penalize him who sells, offers for sale or exposes for sale a package of such stuff because it has not plainly marked on the container the exact weight of the package, would be to place before any dealer in such stuffs his choice of being punished often and continually, or else going out of business.

"It seems to us that we need carry the argument no further. The statement of the facts carries with it its own irresistible conclusion against the soundness of this law. The condition referred to would be intolerable. The sale in this country of such stuffs in packages is imperative. The restrictions and conditions

attempted to be imposed by this law are harsh and oppressive to such extent as to render it practically incapable of enforcement and violation of the 14th Amendment to the Federal Constitution and Sec. 13, Art. 1, of State Constitution."

This decision is of vital interest to millers, to bakers and to all manufacturers and dealers in commodities which are hygroscopic in character and which must necessarily vary in weight from day to day. This decision adds still more force to the contention now generally made by all who are interested in the scientific and intelligent enforcement of equitable legislation, that the true weight of hygroscopic substances can never be obtained by taking the weight of the product at time of sale without determining its moisture free content and adding thereto the legal or recognized moisture content.

Across the Delaware

SELDOM has a member of the baking industry rendered it better service in showing that he is a real citizen and participant in the affairs of his community, than did Paul Schulze in bringing the Gilbert Stuart portrait of George Washington to Chicago.

The Paul Schulze battle for this portrait was a three-months' affair and its objective was to raise \$75,000 with which to buy the portrait. Hundreds of civic associations helped, as did thousands of school children.

The Herald-Examiner, leading newspaper of America's second biggest city, thus records the final day of victory for the baker leader of the winning campaign:

"Paul Schulze, chairman of Mayor Dever's committee of seventy-five, crossed the \$75,000 Delaware yesterday (May 23)

and made the Gilbert Stuart portrait of Washington the permanent property of Chicago.

"It was an exciting finish. For three months to a day, Mr. Schulze had trudged through muddy streets, visiting many offices, written thousands of letters, spent his own money freely, refused to take turn downs, and finally came to the last \$500 needed.

"Hope was held out that one of the large movie concerns would provide the last check until the middle of the afternoon. But it failed. Then came a small avalanche with \$200 from Mrs. Harry D. Dodge, state treasurer of the Daughters of the American Revolution. The University School for Girls sent in a contribution of \$100.30. Samuel Weiss mailed in \$100 and in response to the last batch of special delivery letters a boy came hurrying in with a letter from Attorney Silas Strawn. "Hooray! We're across!" exclaimed Mr. Schulze."

The picture was formally dedicated the next day, and will hereafter hang in Chicago's art museum to inspire and inspirit Young America with the ideals of those who freed and made their country for them.

An Eatmore Bread

"Bread is your best food, eat more of it," has been a slogan for many years. But it remained for Warburtons, Ltd., of the Back o' th' Bank Model Bakery, at Bolton, England, to translate the slogan into the name of a brand of bread. This firm asks you to "telephone number 1585 for Eatmore bread." "I think many times of my visit to the American Institute with my brother and Mr. Butterworth," writes George Warburton of this bakery, "and we have very pleasant recollections of the helpful suggestions made to us there."

For More and Better Toast

*Experience In Hotels and Restaurants Suggests that Few Chefs
Know How to Prepare Toast Right*

By E. H. S. BAILEY

Department of Chemistry, University of Kansas

I AM glad to note the campaign that has been started in Baking Technology for the more general use of toast. It so often happens that the freshly-baked bread is so soft that, when masticated, the mass is not in a physical condition to be attacked to the best advantage by the digestive fluids. This fact has been known and talked about for the last hundred years. The process of toasting completes the work of the baker. He has, in baking, coated the outside of the loaf with the sweet, crisp dextrin of which we are so fond, but from the nature of the case, this condition cannot be extended to the interior of the loaf. Toasting does this for the individual particles of the bread, known as slices. Thus the bread becomes more wholesome, and fortunately much more appetizing.

I wish, however, to enter a plea not only for **more toast**, but for **better toast**. My experience last summer in the hotels and restaurants of the East is that not one cook in ten knows how, or at least takes the trouble to prepare good toast. In fact we never had good toast served for breakfast. From the appearance of the product, when we ordered **dry toast**, they always gave us **singed toast**. It was evidently made over a gas or coal fire, leaving half or it unchanged and the remainder burned to charcoal. It does not need a chemist to decide that when you mix charcoal with your toast the delicate flavor is destroyed.

It is possible and easy, with a little care, to make good, appetizing toast over a fire of charcoal, of anthracite, or better still, by the use of an electric grill. It is

impossible to do this however by heating **quickly** over a gas flame. The everlasting hurry to which we Americans are obliged to submit produces not good toast, but **semi-carbonized bread**.

There are a few processes which require time. The making of toast is one of these. You cannot hurry the formation of the dextrin. It is by gradual heating that the rich, brown, nutty surface is secured. We can allow a "quick" vinegar process, and in a few cases perhaps a "quick" process of fruit ripening, but let us call a halt on the process of "**quick toasting**."

Prof. Bailey has come through experience in restaurants, to exactly the same conclusion arrived at in the American Institute through tests made by Dr. L. A. Rumsey of the Institute staff. The fight against carbonized toast is now going forward through all publicity mediums the Institute is able to reach.

At Our School

DOES it pay to give the young bakery hand a perspective of the entire operation of baking before he is given some little specialized task in the bakery for which alone he would be fitted under shop training conditions?

Recently an Institute visitor found a graduate of the Institute's school at work with knife in hand. He was merely slitting the tops of hearth bread before they went into the oven. It looked like a task anyone could do.

"But if I keep at this," he smiled, "some day there will be an emergency

and I am fitted to do other tasks, too.”

In another shop there was such an emergency. The proprietor of that shop visited the American Institute of Baking.

“How did your student take hold in your shop?” he was asked.

“Take hold,” he replied, “that is not the word for it. We are in the biscuit and bread business also. The principles of biscuit baking ruled the shop and none of us realized how the bread bakery must make its own weather inside the shop, and keep this weather under perfect control, to get the best bread. We had “wild” bread flavors and such a variation in results that we were on the point of going out of the bread business and concentrating on crackers.

“Your student told us frankly the point we had overlooked. He urged us to visit bakeries with cork-insulated, double walled fermentation rooms, where there was both heat and refrigeration to keep temperature control, and a moisture-control apparatus to prevent skins forming on the dough in dry weather.

“We obeyed his edicts, rebuilt, and got such fine results that we made him manager of the bread department, and sent another student to the school to be trained as mixing room foreman. Now these boys each talk the other’s language and as a team they are building up our bread production until it is the pride of the plant. We are sending a third student to learn the same language and support their fine work.”

Mentioned as Ordered

Please insert in the next Baking Technology this item: “Mrs. Calvin Coolidge served at her garden party on May 29, sandwiches made of whole wheat bread.”

—Harvey W. Wiley.

Eight Thousand Toasters

IF BAKERS would cease thinking of the toast campaign as an isolated enterprise, and consider that baked goods are never properly merchandised until they are of high quality, until the consumer knows they are of high quality, and until every facility for their most convenient use is at the consumer’s hand, then the toast campaign will loom out as one of many means to increase the use of baked goods.

In a Missouri town a baker looked at it that way. He determined to put a toaster in every home—and trust to luck as to whether the family preferred to toast bread, rolls, or coffee cake. The first week of his toaster campaign he saw 8,625 toasters put into that many homes that had never known this convenient device before.

A Cake Shop

WILLIAM Schert, a baker of New Orleans, is one of the first in America to branch out in an interesting direction. He discovered in the process of running his bakery that cake making is a mechanical process in which skill in mixing ingredients and in choosing quality ingredients, bring out uniform results.

On the other hand, he found that the processes of fermentation in the making of leavened bread were not mechanical, but bacteriological, and that one might make excellent cake every day but have “wild bread” varying in quality with each batch. He decided that cake making could well absorb all his energies and the oven space of his plant. Therefore he made arrangements with Jos. Reuther, manufacturer on a type of bread that is very agreeably received in New Orleans, to furnish him fresh loaves from each baking. Will his idea grow?

A Month In the Press

WHAT are the papers saying about the bakers and their product—wheat in its baked forms? All who gain or suffer through the moving of the wheat crop into consumption as baked products should be interested, for the tidal flow of newspaper articles gives the key to public thought.

When wheat farmers, millers, railroad men, bakers, and manufacturers of supplies attempted to co-operate in setting up a central body to work for Wheat's welfare, they brought forth an enormous flow of pro-wheat literature.

Dining car superintendents were asked pointed questions by people in a place to gain attention, why they had reduced the bread portion, so often to two very small, or in some cases even one very small biscuit or roll.

Hotel managers were asked, with authority behind the question, why they still clung to the war-made custom of serving two ounces of bread instead of the pre-war four ounces, per order, and often making this order so expensive that bread eating in hotels had almost gone out of fashion.

Work to restore bread to public dining places, and to make its use more convenient in the home by stocking the millions of American wired homes with toasters, started with an enormous impetus. **And, of course, the farmer gained, for every roll, biscuit, slice of bread, or piece of cake eaten dragged behind it another lot of wheat into consumption.**

The great co-operative system set up to search out Wheat's welfare promised to cause the eating up of the farmer's surplus wheat and thus relieve him of his pressing distress, and his bankruptcy price, based on an unsalable surplus with no home market to eat it up.

But Mr. Farmer had little or no trust

in "them slick city fellers" that had asked him to sit in their councils and become one of a team to pull for greater wheat consumption. Whiplashing the "city slicker" was more to Mr. Farmer's liking. Or at least to Mr. Rural Press's liking. The result is that out of 125 newspaper articles received at the American Institute during May, thirty-five were from farm papers lashing the baker, and using him spitefully. The complaint in every case was not that the farmer should get a fair profit from his wheat but that darned if he could live and see the baker getting more out of the price of bread than he got out of the price of wheat. The cry was all on the ratio of division.

From the articles one would never guess that bread is a manufactured product; rather it would appear that bread is merely wheat, and ought to be merchandised the same as potatoes, carrots, peas, and other farm products that merely pass along from soil to consumer in their virgin state as a product of the soil.

They chant a lovely chorus about "wheat has gone down, why doesn't bread follow," but there is not a word about the big manufacturing job done on wheat by the baker, and the way every factor entering that manufacturing cost has gone up and up through the war and still higher on up after the war, so that even taxes are still mounting, not to mention wages, fuel, rents, costs of all repairs, in fact every item that enters into post-war manufacturing in every line.

These spiteful jabs at the baking industry seem enormously different from the work of the prosperous raisin farmers, who want to sell raisins in the form of baked raisin loaves. Instead of passing long-distance judgment on the bakers of bread, and filling the National atmosphere with long howls about "their fair share of the price of the raisin loaf," they get out in front of the baking industry with

banners and drums and glorify the raisin loaf, the raisin pie, and the raisin-filled cake. They direct the consumer's attention to their food—in the form it is eaten, and kept for consumption at the nearest bakery or grocery. As it works out, the raisin growers merchandise through the bakers millions of pounds of raisins, while the wheat farmers' enterprise in using the bakers spitefully works out nothing for their weal. Judging them by their works, it would seem that the wheat farmers have much to learn in merchandising wisdom.

Outside of papers catering to the wheat farmers, the newspaper articles of the month divided their interest between bakery labor problems, laws governing the sale of bread, state conventions, and the nutritional quality of bread in the diet.

Writers on nutrition made the baking industry their debtor for many splendid articles recommending more bread for better health. They recommended milk bread rather than water-mixed bread, and urged the use of milk with bread. Many attractive recipes for toasted sandwiches and rye bread sandwiches completed such articles.

In the matter of bread laws the press took much joy in recording the overthrow of the Nebraska standard weight bill by the Supreme Court. They did not write of it on the merits of the issue but enjoyed an intellectual joy-ride over the principle of "state rights" that thus seemed to get a crashing blow from above. The New York World led off in this particular with a thought scores of editors amplified and adopted for themselves.

Bread price wars between angry factions in the baking industry attracted only four editors—the smallest number that have dealt with baking problems for some time. One of these recorded the giving away of bread free in a price war.

Two Students

TWO men applied for information about the School of Baking of the American Institute. The first was a graduate chemist with years of experience. He was told that would all help him, but that the baking test was after all the real test of flour and bread, so that the more he knew about handling doughs the better it would be for him—in whatever branch of the baking industry he might enter.

This trained man came quietly to school, graduated, worked up through a baker's production department and within two years gained a position with a really first class salary in a big flour mill. His task was to make certain that bakers received the flours they most desired, and that their bread standards called for. His monthly salary check is in four figures.

The second man was also a trained chemist. When he received the information he had requested, he wrote back, "When I was in High School I studied chemistry, so you don't think I would spend \$300 more, do you, to learn to bake bread and rolls. If you do you are crazy with the heat. What I want to study is cake decorating and baking." And this lad did just that. He, too, is successful in a way. He is working hard with skillful hands on a bench,—and in a branch of the industry where machinery is least likely to replace him. As cake baking involves no yeast or bacterial leavening action his mechanical skill will count for him, whereas for bread and rolls a vast field of knowledge he scorned would be highly advantageous.

On the front of each new honey carton manufactured by the G. B. Lewis Co., of Watertown, Wis., is the slogan: "Eat More Bread and Honey." It accompanies a picture of a loaf of bread and a comb of honey.

—Bakers Review.

Books for the Baking Laboratory

MAKING ADVERTISEMENTS, and Making Them Pay. By Roy S. Durstine, Charles Scribner's Sons. 264 pp. Illustrated.

This book is a plea for common sense in advertising. It is, in the words of its publisher, "in no way technical, but in all ways sensible." It is the kind of a book the baker should read who is freeing his mind from other problems and shaping affairs to concentrate on "getting the message of his goods across all barriers to the consumer's table."

The book gives a solid ground work to the man who has not had time to think of message making and effectiveness in advertising appeal. It was chosen for review here because so many leading bakers think the time is now ripe to concentrate on elevating the conception of the baker in the minds of the public which the baker serves. This means action by each baker in his own community. There is a feeling that the time has come to entirely divorce the public from its old conception of the "butcher, the baker, and candlestick maker who all flew out of a rotten patater."

Chapter titles by Mr. Durstine, who writes from the experience of many years as an advertising agent, suggest the spirit he would have business men put into their announcements. Some of these titles run: Getting Out of the Rut; Sincerity; Common Sense; The Great Mystery—Merchandising; Where is Advertising Going?

"There was a time," confides Mr. Durstine, "when advertisers threw buckets full of money at full pages in the magazines just for the fun of seeing it splash. After a few prominent advertisers had wasted considerable sums in this way it was pointed out to them that there was no use advertising their products all over the country if their goods were on sale only in a few points along the Atlantic seaboard."

Are there advertisers who grow vain over their product and finally produce advertising that appeals much more to them than to consumers of their merchandise? Mr. Durstine has found many such vainglorious folk "who lost their sense of balance and their money as well."

One plan he suggests any baker might well adopt. It is to hire a number of interrogators through a second party. Have them canvass the grocers of a city, and ask about bread. But never let the men assigned to this task know what baker they are working for. It is suggested that such inquirers will find out much truth for the

baker, whereas if they know in whose interest they are working they will bring back answers to please that baker. A collar manufacturer adopted such a plan and discovered to his surprise that he was very unpopular with the trade, whereas his own salesmen had never been able to find that out.

The causes were easy to remedy and this particular collar man soon had the task attended to.

If you were going to start a little library in your baking or milling laboratory what books would you begin with? H. L. Beecher of the Eagle Roller Mill Co., at New Ulm, Minn., has started a library with the following: The Technology of Bread Making, William Jago; Chemistry of Bread Making, James Grant; The Book of Bread, Owen Simmons; Observations on Milling, Edgar Miller; Food Products, H. C. Sherman; The Yeasts, A. Guillermond; Newer Knowledge of Nutrition, McCollum.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Flour and bread as colloid systems. R. A. Gortner. Ind. Eng. Chem. 15, 1218-9, (1923).—Variation in the physico-chemical properties of the protein glutenin causes variations in the baking qualities of wheat. Apparently the staling of bread is not due to the loss of water from the loaf but to changes in the protein starch gel.

Ruth Buchanan.

The role of bread in nutrition. Worthington Hale. Ind. Eng. Chem. 15, 1221-4, (1923).—Experiments given show that the industry to-day is developing a bread which is a well balanced food as compared to former white breads and whole wheat breads.

Ruth Buchanan.

Reproduction of animals on an exclusive diet of bread. Charles Hoffman, Ind. Eng. Chem. 15, 1225-32 (1923).—Experiments are described which show that vitovim bread when fed as the sole food produces normal growth and health in young test animals. Eight generations of mice and five generations of albino rats have been reared on this bread and water. Children fed vitovim bread make

greater gains in height and weight than children fed with ordinary bread.

Ruth Buchanan.

Variation in the weight of flour kept in 100-kg. bags and in 500-g. cartons. M. Arpin and (Miss) T. Pecaud. *Ann. fals.* 16, 586-97 (1913).—The maximum loses observed were 2.05% for 100-kg. bags, 4.60% for 500-g. cartons of patent flour, and 3.60% for 500-g. cartons of groats.

A. Papineau-Couture.

Progress in vitamin research. Casimir Funk and H. E. Dubin. *J. Am. Pharm. Assoc.* 12, 1077-80 (1923).—The status of the subject is presented.

L. E. Warren.

A viscosimetric study of wheat starches. O. S. Rask and C. L. Alsberg. *Cereal Chemistry* 1, 7-26 (1924).—A viscosimetric technic is described for determining viscosities of starch pastes at 90 degrees and at concentrations ranging from 2.85% to 5.75%. The relation between viscosity of gelatinized starch paste and its concentration is expressed by the equation $\log y$ equals $m \times$ plus $\log b$, where y is observed viscosity, x is concentration of the starch and m and b are constants. In samples examined, with one exception, starches of the winter wheats had the highest viscosities and those of the spring wheats the lowest. High starch viscosity was also observed to be associated with two or more of the following conditions in the case of each flour (1) low loaf volume, (2) low protein content, (3) high temperature of locality of growth. Low viscosities were observed with the opposite conditions.

Ruth Buchanan.

Physical tests of flour quality with the Chopin extensimeter. C. H. Bailey and Amy M. LeVesconte. *Cereal Chemistry* 1, 38-63 (1924).—Translation of Chopin's paper describing his extensimeter is given. Experiments described show that prolonged mechanical mixing of the dough decreases the extensibility of the dough appreciably. The H-ion concentration is a factor in determining the extensibility of dough. Increasing water in the dough tends to make it more extensible, less tenacious and more easily stretched. Cl treatment of flour tends to decrease slightly the elasticity of the dough. Flour improvers are primarily yeasts foods and do not increase the strength of a flour. CaHPO_4 tends to increase extensibility of the dough; H_2PO_4 decreases it only slightly in the proportions used. The

extensimeter readings afford a useful index of the extensibility of a dough and are of value as an indication of the strength or baking value of a flour.

Ruth Buchanan.

The bacteriology of flour and cereals. A problem. Martin Dupray. *J. Am. Assn. Cereal Chem.* 8, 160-5 (1923).—Conditions of moisture, temperature, and O supply obtained during storage, as well as moisture at time of storage of flour determine whether there will be growth of organisms, the amount of growth, the particular varieties that will grow, and the resulting chemical changes in flour.

Ruth Buchanan.

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H. A. Lepper.

Weak Points in the Loaf

A BAKER who had built up his business without other training than that of the hard school of experience, developed a loaf that was among the excellent loaves of the middle west.

One day it developed a few weak points and he decided to send it to the American Institute for study and analysis. The Institute found it a fine loaf—among the best to come in. But it suffered slightly from over fermentation. The baker was so advised, and was told of the importance of watching doughs closely to prevent their getting too old.

The baker established a better regulated system of taking doughs. And samples of bread came through for over a year in which there was nothing to complain about. But he did not cease seeking constant advice and suggestions from the Institute. When so many other bakers had bread that was much worse this seemed a case of painting the lily.

But one day some loaves came through that suffered again from improper fermentation. This time the loaves showed that the dough was too young. The baker was informed that taking doughs too soon was as disastrous as taking them when they were too old. He learned now to watch the doughs even more closely—and to get them at the exact time of full maturity. Splendid loaves came through after this second correction of the fermentation time.

"We feel that your service," wrote this baker in a spirit showing a comprehension of why the baking industry itself established this quality-enhancing department of Association activities, "has been of great benefit to us showing weak points in our bread. We hope we can improve it still further. We shall not be satisfied with our bread until we have equalled

and exceeded the highest score you have ever given." This baker is not very far from the top now. He has reached a score of 96 with 96½ ranking as the top score ever given.

A Field Test for Freshness

Not all the fine experiments in determining bread quality are made in the indoor laboratory. David Ackerman, in Spokane, is conducting some splendid tests to determine the relationship of bread consumption to degree of freshness of the product. He has found that bread is eaten much less readily after it has been out of the oven more than a definite period. Final results of these tests will be published in August. They have gone far enough already to show the importance of keeping bread moving rapidly from oven to consumption.

The Old Lid Method

One of several hundreds of letters arriving at the service department was of special interest to O. W. Hall, in charge. Mr. Hall received a loaf of bread with a pale straw colored crust, very large volume, a gray crumb, a coarse and crumbly grain, and a sour flavor and taste. These attributes made it clear to him that the loaf was from very old, over-fermented dough. He found the baker had a lid on a six foot dough trough into which he poured the dough resulting from the use of one barrel of flour. When the dough lifted the lid he punched it, waited till the lid was tilted again, and gave it a second punch. Then he waited awhile and took the dough.

He was advised to dam the trough up to 4 feet, and then punch the dough before it tilted the lid.

BAKING TECHNOLOGY

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in Baking*



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The Baker's Newer Message

TWO great forces are operating throughout the world of food events, one to cut down bread consumption and the other to increase it. The first is the newer interest in dietetics and the determination of sedentary city folks to reduce weight by lessening their food intake. These city folks have been real victims of an improper diet and their use of the soda mint tablet as a sort of universal American dessert is the

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proof that things have been radically wrong with them. It is now known that an acid stomach after meals is a crime against sane eating, and that the hotel or restaurant serving foods that have pro-

duced the necessity of a dose of soda for dessert, fail in their primary obligation to serve meals. In the place of meals too many restaurants serve items of a meal, and leave the buyer to fight his way through to a balanced ration at the end.

If the food buyer has unusual skill and knowledge of dietetics he may win out somehow, but if he faces high charges for the foods essential to balance bread,

meat, and potatoes, and without which these three acid-forming foods cannot become a complete meal, then he is likely to let the essential salads, fruit, and potherbs go,—and blame bread for a

trouble that came from an unbalanced diet.

So many people have fallen victims to habitual acidosis of the stomach, due to improper eating, and then have gone to the doctors for relief only to be given prescriptions for rhubarb and soda, or soda straight, without any prescription for right eating, that these people in turn have fallen victims to the "food faddists." And they join the faddists in their assault on the medical profession from which they turned in disgust.

The Sandwich Shops

The faddists have a partial glimpse of the important truth that meals must be balanced with fresh green foods if bread and meat are to perform their rightful function of furnishing energy food and proteins to the body. But instead of supplementing bread and meat with the foods always essential to their successful use, the faddists have fallen on bread with a heavy cudgel. They recommend its elimination to the sufferer from an upset stomach, to the sufferer from obesity, to the sufferer from acidosis.

This phase of bread derogation will pass as more knowledge of the kind Prof. McCollum of Johns Hopkins has developed becomes part of the common fund of the peoples' information.

And in the meantime, while certain food faddists are heaping upon the head of bread all the sins of improper eating foisted upon diners in public places by the over-extended *à la carte* system, another group is forcing bread consumption upward at a rapid rate. This group consists of restaurant men who serve what might be called "Bread And—Lunches."

They have rediscovered the great American sandwich, and with it have discovered that the sandwich filler should be one of the foods that naturally balance bread and make it a complete food.

From meals composed of such sandwiches—usually three-deck sandwiches—there is never any S. O. S. call after eating for the doctor's prescription of rhubarb and soda, or the soda mint bottle from the drug store. The sandwich meals satisfy. Hence the remarkable, almost phenomenal, growth of the "sandwich shops," of the great cities.

A chain of them began in Kansas City. It did not slip a little dry cheese in between butterless slices of dry bread and call this a "sandwich." It developed fillers and developed toast as the basic food the fillers must supplement.

Watch the sandwich shops in your town. Three have just invaded Chicago, and already queues of people line up at lunch time to obtain their delicious offerings of bread and "fillin'" that satisfies and leaves no come-back.

This article is printed because both of the groups mentioned above need the constant watchfulness of the baker. At the American Institute many experiments are under way to determine just what bread fillings best set off the bread and balance it into a complete ration. Many such balancing foods are now fully determined, and it is interesting to note that the meals from which people flee and those of the sandwich shops towards which they are being attracted, show, on the one hand, unintelligent ignoring of the need to furnish a diner a **meal**, not a string of items, and on the other hand an intelligent understanding that the sandwich can either make or break the stomach of its eater, according to the way it is made.

Our Atlantic City Exhibit

How about plans to keep in touch with your public? The story of bread is one the bakers must tell the public more and more insistently from now on. It is becoming the major thought of the industry just as the fight for sanitation was the major thought of the industry five years

ago, and as the matter of wrapping bread was the major thought of the industry five years before that.

A baker in Missouri discovered this growing tendency towards tasty sandwich manufacture. He studied the field and listed twenty or more of the very best sandwich fillers. He obtained space in the Sunday rotogravure section of his town's newspaper and began a curious food crusade. He urged in twenty advertisements, each one succeeding another, that bread be used as the **basic** food with each one of sandwich fillers he had found to be desirable. Thus he advertised many foods besides his own. Would you like to see this baker's advertisements and his sandwich filler selections? They will all be on display at the Atlantic City Convention, during the week of September 21.

At this convention the first united effort of the bakers of America to develop a knowledge of advertising will be made. Nobody will be advertised, but the advertising skill and knowledge of all will be thrown into a common pot, out of which each and every baker can dip according to his needs.

The Fleischmann Co., experienced advertisers who know how easy it is to throw fortunes in advertising away as well as to put advertising to work to the best advantage, will contribute to the display all the current exhibits this company has worked up.

Reaching Local Groups

The company has found that the baker who serves only a small part of a city is foolish to advertise in the generally circulated papers. The cost becomes prohibitive for the benefits returned. There are many ways, other than the newspapers, to reach the local group. What are they? You can study them all at the convention exhibit.

Have you thought of beautifying the grounds around your shop? One baker

did that,—and made his grounds famous. He even painted a garden scene on the sidewall and it blended so well with the garden beside the building that, like the back-drop in the theater, it made the garden seem to extend indefinitely off towards the horizon. How he accomplished this work of beautification will be a convention story, twice told in the exhibit of the American Institute.

It really gave this writer a thrill to see package after package of advertising matter arrive at the Institute in response to the call to bakers that each submit his work for such arrangement at Atlantic City that all bakers can study the whole field of accomplishments.

A Generous Response

These bundles of exhibition material have been accompanied by letters which show that the bakers realize that the time has come for advertising the industry on a large scale, and gaining a more intimate contact between bakers and the consumers of their product. It is the same intimate contact wheat farmers need between themselves as growers of wheat and the bakers as merchandizers of their wheat in the form in which it is eaten,—the same contact G. Harold Powell established on behalf of the orange growers of California with their merchandisers,—the wholesale jobbers and distributors of New York, as a prelude to the enormous increase he brought about in orange sales.

Bakers who have anything to tell their fellows about the baker's story are invited to send in their material to become part of the exhibit. Bakers who are wondering what the potentialities of their situation are, are invited to make a special study of all the material to be assembled, with a view of finding what fits their case to the best advantage when they get back home and can put their object lesson into action.

A View of Our Institute

WE bakers have every reason to be proud of the American Institute of Baking. It is the splendid product of an unselfish service by men who visioned the baking industry of the future and worked toward the end of the vision's fulfillment. I visited the Institute in the same frame of mind—that of a doubter—that any baker might have had. And I want to say frankly that what impressed me most was the attitude of the Institute staff,—the men who are giving of their time and talents to better the baking industry. They are certainly entitled to your loyalty, and to the moral and financial support of every baker in the country.

The Association has developed in the Institute a center and a rallying ground for the Industry in its contacts with all outside factors that involve our welfare. It makes the contact for us with the men of Science whose researches touch baking affairs; it makes the contact with publicity centers. Its very list of visitors speaks volumes for our industrial weal. They come from Japan—a baker turning there to white bread because of the rice scarcity visits the Institute to learn about American baking methods. He immediately decided to send his son as a student in the School of Baking. Army officers charged with the duty of baking bread for the U. S. Army come there to found Reserve Company No. 1 of a Baking Corps for the next war. Writers for great magazines come for data, and their articles have something to say instead of merely reviling us.

As our industry grows the need for the Institute will become more acute. The Institute, a product of co-operation, breeds co-operation, and co-operation is the only means by which we can climb to the higher place which should be ours. Why should any baker lag back with his

support, shunting the burden to others in a self-centered way. No baker can escape sharing the benefits of its Nationwide surveys and service in building morale and good name for us.

—Charles W. Ortman,
Ortman's Bakery, Omaha, Neb.

Bread in Chile

THE bread we make here in Chile is a kind peculiar to this country. We are a long distance from any scientific bread makers, and I am therefore writing you to ascertain whether it would be possible for you to outline a complete scheme of temperatures for making up batches of yeast and also to outline a steam room regime for raising the dough after it has been placed on the racks. Our bakery is located at an altitude of 10,000 feet in a country where the air is absolutely dry and where no rain falls during the year.

At present our mix is made up as follows: 100 pounds of flour are mixed with 1 kilogramme of salt, 30 liters of water, and makes approximately 52 kilogrammes of bread, loaves which are of flat oval shape about four inches square. This is mixed together in the mixing machine and yeast, made up in the following manner, is added: At about four o'clock in the morning there is mixed 5 lbs. of sugar, 25 bbls. of flour, 100 grammes of hops and 300 grammes of potatoes. This mixture ferments in about four hours, and to this is then added 400 lbs. of flour, and the whole well mixed. Of this mixture 15 lbs. to 20 lbs. are added to each 100 lb. batch, the amount added depending on the temperature, during hot weather 15 lbs. being added and during cold weather 20 lbs. The mixture is then turned out of the mixing machine into the trough, and when the trough is full it is allowed to stand until the experience of the baker teaches him, by

trial of the consistency, that the batch is ready for forming into loaves. It is then formed into loaves and raised in the ordinary atmosphere of the room until the baker's experience considers it sufficient, when it is put into the oven. The oven is wood-fired with the products of combustion going directly through the arch of the oven to the chimney. The baker thinks that he gets a temperature from 650 degrees to 700 degrees, but the oven is heated to a higher temperature than this, and then left for about two hours for the heat to equalize, and when the baker's experience shows him that the oven is hot enough he starts to bake.

Perhaps our troubles may be due to baker's experience, or to his application of it, but there is not much regularity in the bread, one day we get fairly good results and the next day the bread will be poor. Since we use from 8,000 to 10,000 lbs. of flour per day you can see that our bakery is fairly good size, and it has occurred to me that the application of scientific bread making and the training of the baker, would probably result in much more consistent results.

—From a letter of H. M. Dougherty,
Chief Engineer, the Chile Exploration
Co., Chuquicamanta, Chile.

In the Schools

NONE of them can leave baking alone these days. They are slowly finding out that the woman who is content to be a kitchen drudge is not growing up into womanhood any longer. One teacher writes us for information as to ways we have noticed social life changing through the lessening of kitchen work.

A youth writes from the University of Pennsylvania that he is writing a graduating thesis upon the subject of "government control in the baking industry." This youth intends to enter the baking

business after his graduation. It is too bad he cannot first get some experience in some line of business that has bureaucratic supervision. One of the Institute staff members served on the staff of the Board of Railroad Wages through the war and saw a crude bureaucracy ruin about every vestige of efficiency. It was all done through the human weakness of man to show authority. Red tape artists gained authority and could wield it without responsibility. They "gummed the game" in the matter of almost every issue passing through their hands by merely arbitrarily holding it up, or reversing action of papers and decisions that had to go through in order to keep things moving.

Government bakeries would probably be a more costly experiment than running a yacht or drilling for oil in unproved ground. The plan to put them into action again recalls Chicago's Municipal Cart Factory. After a little while, when politics had gained a firm foothold, it cost the city more to put a spoke in an injured wheel than to buy a whole new wagon from a commercial manufacturer.

Toast—for Rugby Men

The American Rugby team sent abroad to compete in the Olympic games created something of a sensation in their Paris hotel, it would seem from reports sent home by sporting writers. It seems that the chef of the hotel was justly proud of his elaborate menu of French dishes, but that Manager Austin of the American team took one look at them and ordered up a training-table diet of steaks, prunes, toast, and a dish of bran at breakfast. Jean Baptiste, the chef, served the meals as ordered, but with more imprecations upon the "Spartan diet" than blessings on such strange food—which he felt unworthy of his fine hotel.

BAKING TECHNOLOGY

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I. K. RUSSELL, Editor

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JULY 15, 1924

We Work Together

***To win through quality production
and the utilization of scientific research
a welcome for two loaves of wheaten
bread for every one that now finds favor.***

On Our Way

WE are standing on the boardwalk at Atlantic City. The sun is shining brightly. The gleaming blue sea and the clean white sand are filled with beautiful mermaids. The air resounds to the laughter of happy children interspersed with the music of orchestra and band and the deep bass of the rolling breakers. The world seems to be viewed through rose colored glass while silken screens remove all extraneous noises from the music in the air. Under such circumstances we cannot keep our mind on our work and we move back into the hotel to continue plans for the big convention in September. Even there, the rose colored glasses seem to have followed us. For, criticize as we may, indications are present that all of us must leave Atlantic City in September as better men, better members of American Bakers Association, and, therefore, better bakers. Have you made your reservation?

RAYMOND K. STRITZINGER,
President.

A Remarkable Ad

ANY baker concerned with how the public like his product, could with advantage to himself obtain a copy of the Charlotte News for Sunday, July 6. There is a special section in this newspaper devoted to the Carolina Baking Company.

The point about the special section is that all who have a story to tell about modern bread to the public, co-operated to tell it in this concentrated focusing of the issue. The bread company tells its story. Then the paper company making the shipping boxes tells its story. This is followed by the story of the plant, with its invitation to all to visit it. The yeast company whose yeast goes into the bread tells how "the invisible millions of giants make the bread you eat healthful and tasty."

The salt company whose "supreme quality of salt goes into the bread you like" tells why it made salt 99.72 per cent pure for bakers' use. Then the flour companies whose flour is blended into the bread output tells how they strive for better flour to make better bread. The wrapping machine company, the electric truck company, the oven builder, the shortening manufacturer, the fuel merchandiser, and the cake-ingredients merchandiser, all tell the story of how they will help to make this baker's bread a good product.

A special thrill came to this reader of the special section when he encountered a full-page advertisement by the Charlotte Chamber of Commerce. It told 12 reasons why the Chamber believes in Charlotte, and why it welcomes enterprising business men in the baking field. This is important. The next great move in our industry is to ally itself strongly with the Chamber of Commerce, not only locally in each state and city, but nationally with the National Chamber in Washington.

A Letter to Read

THE note above is written as a preface to a request. It is that all bakers receiving this magazine read the letter from a baker to the head of the America Institute, printed elsewhere. The letter begins: "You owe me nothing; we owe you nothing; therefore we are quits." It is a plea of avoidance of one who wishes to find an excuse not to join with his fellow bakers in doing the work that all must do together, if that work is ever to be done. It speaks of "bakers of my size," as bakers who should keep out of the National organization.

If the coming convention at Atlantic City were only a convention where bulk and size counted it would never be held. Men of bulk and size could gather by themselves in their own little clique, but they are wise men and they know there are hundreds of problems that can never be solved until they are solved for the industry as a whole. They know there is a morale that can be captured for the baking industry, in the public esteem, only when it is captured for the industry as a whole, just as it was captured for apples when all the rots, spots and windfalls were eliminated from the apples that went to market.

Thousands of apple growers co-operated to that end before the morale began to grow, just as thousands, and not hundreds or scores of bakers, must work up the coming morale for baked goods. The National association that brings the men of this and every industry together must of necessity be a convening of men, as men who are co-operating to build the industry. Mr. Eighty Ovens will not at this convention throw his bulk against Mr. Forty Ovens, nor will Mr. Ten Ovens try to make Mr. Five Ovens look like small potatoes. Mr. One Oven may be the most useful man there if his talk contains the germ of a sound idea that can be utilized for the good of all members of our industry.

By Radio

WHAT shall we say of the super revolution radio brought about in July, 1924? Bakers did not work out of their time when they so developed bread making that the housewife could buy bakers' bread with confidence. There were women who asked if their sisters would really find something as useful as baking bread to do, if they accepted the leisure bakers afforded them. Women answered by becoming the world's premier radio fans. They had them in their homes, hooked up to loud speakers, when the Democrats enjoyed their long tie-up at New York. They listened. Suddenly the end of an era of world's history came. Mr. Husband came home from the office and found his wife chattering to him, wildly, enthusiastically—about the one pet hobby where he had always reigned supreme. Politics had become her field. She was "daffy" over Chairman Walsh and wished she could vote for him for president. She was "wild" about Al Smith and his speech, in which he pledged support to the ultimately chosen candidate. One husband was aroused out of his sleep to be told the latest convention news, for which Wifey had sat up, and he grumbled sleepily, "O go away and let me sleep." Where now is the Cave Man, and his skill in ruling the destiny of nations? Where now the famous writers on politics? The Mrs. at home knows more than her husband can tell her and may tell him more than he'll want to listen to. The Radioed Congress is next in line. And the reaction to any speech will be direct and forceful—right from the home where every word has been appraised before the first newspaper has begun to set type on its Washington dispatch!

American Bakers Association is not overlooking the radio. Its speakers seize every chance to face the microphone and through it the nation's women who buy its bread and now create their own political heroes by radio via the loud speaker.

Raisins' Lesson For Wheat

What Concentrated Merchandising Accomplished for Growers of One Particular Bread Ingredient

By DR. C. F. RUDMANN

of the Research Department American Institute of Baking

SHOULD the baker and the wheat grower study intensively together all the conditions surrounding the growing, sale, distribution, and final consumption of wheat which the farmer grows, and which the baker merchandises in the final form in which it is eaten?

That is exactly what the raisin producers did and do, and one of the fine examples of the message that Raisins has for Bread, can be told in the terms of the recent increase in the sale of raisins through America's bread producers. It is told here because it sketches a pattern all interested in wheat can follow in many another direction.

The story begins back in the war days. In those days the raisin growers, as they will frankly tell you, "made a mistake." There were wild ideas about prohibition and "raisin wine," and a flurry of sales to people who did not care what they paid for their product. Price-hoisting fevers ran through many industries, and the price of raisins soared to a height where the bakers simply would not have anything to do with them. In seeking a new market after the war, Raisin growers overlooked their friends in the bake shop, and treated them, in fact, like poor relations.

If they didn't care what happened to raisins as a baking ingredient, well, then, neither did the bakers care. Ill feelings grew up in response to a "take it or leave it" attitude on the part of the sellers. And raisin bread became mostly an item of history, just as the fine toast of our grandfathers did and just as the bread-and-milk dish of our mother's day did. Per-

haps these disappearances concern points of bread service that the bakers have overlooked as the raisin growers overlooked the baking industry—for a year or two.

Then came the day of the Co-operative Control, and intelligent surveys of the whole industry from a central office, with power to act. This central office was patterned after that through which G. Harold Powell controlled the merchandising of the entire orange crop of California.

It could control the merchandising of an entire raisin crop, practically, and its managers had learned the lesson that profits lay in **volume** not in **margin**.

Volume of sales to bakers had been sacrificed to margin of profit. Now it was time to survey the wreck, put it in the shop, and bring out a new machine. The raisin growers found they had three groups to conquer—and a baking situation to take advantage of.

First they had to recover the baker's good will after the year of disputes due to an overpriced product. Then they had to recover the mental receptivity of the people as a whole. Folks had forgotten about raisin bread. But if bakers could be induced to bake it again and people could be induced to eat it again—that the old-time volume might come back again to the raisin sales to bakeries.

It meant prodigious effort, and spending money on a scale that makes the average person dizzy. When a representative of the raisin growers dropped in at the offices of the American Institute with the statement that he proposed to spend, that year, a total of \$2,500,000

just in urging people to visit their nearest bakery to buy good raisin bread and good raisin pie, the sum seemed staggering. It was thirty-five times the entire budget of American Bakers Association for all purposes.

Yet the newspapers spoke, the billboards spoke, window cards spoke—all about going to the nearest baker for baked goods containing raisins. And even the pages of the great magazines spoke. The baking industry was being enveloped from without by a service that must of necessity help it along in every field, as well as that of the raisin growers alone.

So far the story has altogether to do with **outgo**. The test was to come when **intake** was to be measured. The measurement of the intake did not at first measure up to the outgo and the experiment "was in the red." But the advertising program was not being put over merely as a flair to be broadcasted—and forgotten. Intensive study had to be made all the way along the line as it was by the promoters of the American Institute's toast campaign when they followed the wires of every electrically wired home in many communities, with toasters made to put those wired homes into action as electrically-made toast users.

In this case the thing the raisin growers found out was that in the middle of the week the bakers had a few "light days." Since raisin pie and raisin baked goods in general were suitable for use on special occasions they conceived the idea of a "raisin bread day."

Wednesday was hit upon as the best day to induce people to think of raisin bread and raisin pie. So Wednesday became raisin day. It is an enormous task to make the whole people of America think simultaneously of some one food product. So that a baker with an imagination can see the campaign that was essential to making Wednesday "raisin

day." It wasn't done locally in any one place more than another. It was done from a central office, guided by a central manager working for all. Fox Corner got the message on its bill boards just as adequately as the dwellers in tall apartment houses on Manhattan Isle got it, and as the dwellers in three-story apartment houses in Cook County got it.

There was super-intelligence in this advertising campaign, too, for the Sun-maid Raisin Co., co-operatively owned by the growers, and so not an "exploiter" of the farmer, saw that what would pay them best would be to focus public thought not on themselves but on the neighborhood bakers. So the signer of each advertisement was not the company but "Your Baker."

That's the idea the miller has come to when he advertises bakers' bread instead of his brand of flour. And it's the idea the Fleischmann Co. has come to in promoting the sale of bread to promote the sale to bread makers of this company's yeast. It's the idea, in fact, that is revolutionizing ideals and methods in the advertising and trade promotion field. It is putting into action the slogan for which the baking industry is indebted to John Burns of the Allied Trades, "advertise it as it is eaten."

Each baker can now find the answer for himself to what all this industry with banners and drums in front of his shop, and shipping to him of carefully selected and packed raisins from the farm-background to his shop, has done for him. Are sales on Wednesday not duplicating those of Saturday, and is the Wednesday increase led by raisin products? If so then each baker where this is so can answer for himself. Where it is not so the baker has a situation worthy of closer study.

"Standing orders for raisin bread every Wednesday," were suggested to bakers as a thing to speak to their customers

about—especially those who came too late to participate in the special Wednesday bakings.

To the studying of the Infinitely Small among the factors in the case there was no possible end, it seemed. Once people were started towards the "raisin bread on Wednesday" habit it became necessary to study the sales intensively to see that people who bought once came back again for more.

In the Hotels

It was found that some bakers were "tight" with their raisin supply and the loaf hardly lived up to its name nor the expectations of its purchasers. There was a remedy for this. Bakers using raisins plentifully were told to display cut loaves in their windows. This attracted the trade towards the store of genuine service and away from the store where the bread was not so good. It also induced the bakers concerned to study the folly of baking scant-filled loaves as the raisin growers had had to study the folly of the high-margin as against large volume in sales.

There are stories of hotel managers who hesitated to have raisin bread on their menu, saying that people never ordered it. However, on being persuaded to give it a trial, by putting it on the table with other breads—its rate of disappearance was sufficient proof of its popularity.

Raisin bread toasted has an additional appeal and many restaurants feature toasted raisin bread. It is really surprising how many slices of toasted raisin bread (with plenty of raisins) can be eaten by one person with no apparent discomfort.

One Eastern baker reported an increase of 750 per cent in sales of raisin bread, another in the same state reports 700 per cent and many cities in New York reported increases of 300 to 500 per cent over the business of 1922.

Many bakers hesitated to make raisin bread, saying that it was too much trouble. Many wholesale bakers have held out for a year or so on this line and have finally taken it up because of dealers' demands, wishing to supply consumers. One of the demonstrators told a story of a baker in a town of 30,000 population. This man falls under the classification above. One day several ladies came into this store to purchase raisin bread for an entertainment they were giving. It was the third bakery they had visited and they gave as their opinion that bakers were surely not up to date business men when they did not try to supply peoples' wants. The demonstrator who was present, directed them to a shop that baked raisin bread. We might readily conclude that the baker was willing to make a raisin dough after this experience.

Numerous stories of this kind could be related illustrating the success of the raisin campaign and the Retail Bakers Association of America and the American Bakers Association have not hesitated to endorse this campaign as being beneficial to the bakers. Certainly the raisin growers' profit as they dispose of their crops but they are paying for the advertising which costs the baker nothing and has been found to give the baker increased returns on other baked goods as well as on raisin bread. Evidently, mothers, fathers and children are also taking advantage of the campaign, as they would not be increasing their purchases if the product was not generally satisfactory. So the campaign which is continuing on virtually the same lines as previously has been successful from several viewpoints.

The Campaign's Success

As to the success of the campaign, there is no question. It has benefited the raisin growers whose average holding of raisin vineyards is but twenty to twenty-five acres, the bakers large and small who have

taken advantage of the campaign and we trust also the consumers of good raisin bread. There are many testimonials, stories and figures as to the success, and a few of those will be mentioned.

A railroad engineer came in a lunch room here in Chicago one day and ordered raisin pie. The waiter said they were out—not having ordered enough for that day. The engineer replied that he was very sorry and would have to go elsewhere as he “just had to have” raisin pie. He had just come in from his run and had developed an “awful” appetite for raisin pie by observing the billboards with such appealing cuts of this pie.

In Chain Stores

One of the largest chain grocery stores, after many requests at a chance for a demonstration, finally consented. The consent was due chiefly to the housewives' constant demand for the articles which were then reported to headquarters by the store manager. The result was, on the fifth week, a production of 32,000 loaves.

A Maine baker wrote in that they had previously baked just a few raisin loaves on Saturday and finally decided to try the Wednesday plan. They were much pleased with the successful change and found that their other bread sales were not cut but were increased.

The Wednesday special plan has had its effect not only on Wednesdays but on other days as well, as various bakers have reported. One western baker, for example, wrote in to this effect saying that his sales had increased, Wednesdays and other days, to 300 per cent. Many customers buying raisin bread on the special day found that they liked it well enough to want it frequently so that additional sales were stimulated. Many bakers, wholesale bakers especially, have baked raisin bread for restaurants and stores daily and the various ads tell about raisin bread so that all are helped even though the Wednesday idea is stressed.

At A New Task

THOSE who attended the bakers' convention at French Lick Springs last year will recall that one of the most entertaining speakers on the program was Miss Anne Pierce. Miss Pierce spoke as director of the New York Tribune Institute, through which a great amount of publicity upon bread topics had been released. Both before and after her appearance as a convention speaker Miss Pierce wrote genuinely informative articles about the baking industry which did much to wake the public up to its new advances.

Friends of Miss Pierce in the baking industry will be pleased to learn that she has now opened an office to act independently as “consultant, lecturer, and special writer on the merchandising of foods and household appliances,” with offices at 30 Fifth Avenue. She resigned from the Herald-Tribune June 20. For four years Miss Pierce was assistant to Dr. Harvey W. Wiley during the formative period following the enactment of the Pure Food Law.

Shop Cooperation

This is the day for cooperation—real cooperation. Did you ever stop to think that this bakery is a cooperative institution? Instead of the people doing their baking individually in hundreds of homes, they cooperate with us and we do their baking in our model bakery. Instead of hundreds of batches of dough, we make one batch for all. Instead of hundreds of fires heating hundreds of ovens, we heat one big oven. Try a loaf of our bread tomorrow and see if it isn't just as good—or a wee bit better—than the bread you've been working so hard to bake at home.

—An ad. of The Tekoa Bakery,
Tekoa, Washington.

The Flour Mill At Work

How the Roller Milling Process Separates Each Part of the Wheat Kernel From its Neighbor

By C. H. BAILEY*

Of the University of Minnesota

THE success of the roller milling process is dependent upon the fact that substantial differences exist in the physical properties of the several wheat kernel structures. Thus, the branny covering of the berry is distinguished by its tough, fibrous character. The germ, or embryo, is rich in fats and oils, and hence tends to flake when crushed between rollers. The endosperm, or floury portion, on the other hand, is friable and tends to fracture when struck. It is impossible, however, to effect a quantitative separation of the various kernel structures in roller milling. Small quantities of the fibrous bran and the oily germ find their way into the flour, and particularly into the low or clear grades. A substantial proportion of endosperm or floury material is likewise to be found in the by-products, bran and middlings. Commercial bran not infrequently contains 15 to 20 per cent of flour, while commercial standard middlings are often found to contain 30 per cent or more of flour. It accordingly follows that, of the 82 to 85 per cent of endosperm (potentially flour) to be found in the average plump wheat kernel, not to exceed 72 to 75 per cent of the kernel is separated in the form of straight grade flour.

In the modern roller mill the first important process is cleaning and conditioning the grain. Commercial wheat frequently contains a considerable quantity of foreign matter, including weed seeds, sticks, stones, fragments of straw, etc. An effort is made to separate these from the wheat as completely as possible before the latter is

ground. Northwestern grown hard spring wheat contains more of this foreign matter or dockage than does any other class of American wheat, and a variety of cleaning appliances are necessary to the separation of the foreign matter in this wheat. Certain of the weed seeds, which are most difficult of separation, are of interest to the chemist because of constituents which they contain. Thus the seed of the corn cockle, *Agrostemma githago*, contains a saponin which is reported to be somewhat toxic. The seed of the wild vetch, *Vicia angustifolia*, is very yellow, owing to the carotinoid pigments which it contains, and a cyanogenetic glucoside found in this seed yields hydrocyanic acid and benzaldehyde when treated with warm water. If wild vetch seed is present in wheat in excess of 1 per cent at the time of milling, the characteristic odor of benzaldehyde will be observed in the dough when the flour is mixed with water. Seeds of the giant ragweed, commonly known as "king heads" in the grain trade, if present in wheat at the time it is ground, result in flour of less desirable properties. It is accordingly necessary that such seeds be separated before attempting to grind the wheat.

The spores of bunt or stinking smut are frequently found in commercial grain, particularly from western areas, and relatively small amounts of this material will darken the flour appreciably. Several special treatments are resorted to in order to remove these smut spores, including scouring with bolted air-slacked lime, and washing with liberal quantities of water. In the latter event special machinery must be available for "whizzing" the wheat in a

*Reprinted by permission from the Journal of Industrial and Engineering Chemistry.

centrifugal drier to remove the excess of water.

It is a common practice to add appreciable quantities of water to dry wheat before grinding, in an effort to enhance the toughness of the branny covering. This water may be added in the wet washing process or may be sprayed upon the grain in what is commonly known as the tempering process. Frequently, cold wheat is warmed slightly before the tempering water is added. The moistened grain is held for a few hours in order that the bran may absorb the added water, but the period is so adjusted that no substantial penetration of the water into the endosperm results.

The cleaned and tempered wheat is then crushed by passing it between corrugated steel rollers. The individual rollers of the pair revolve at different rates of speed, the differential being commonly about 2.5 to 1. After the first breaking or crushing of the wheat, the resulting chop is bolted and the coarse material reground between another pair of corrugated break rolls. Five or six breaks are ordinarily provided in hard wheat mills, and after the last break the coarse material is known as bran.

In addition to the coarse fractions scalped from the break roll chop, two other classes of materials are separated on bolting this chop. The fine portion which will pass through a bolting silk is known as break flour, and is sprouted directly to the flour bins. Fragments intermediate in size between the coarse fraction and the flour are known as "middlings." These are further classified by passing them over a sieve in a machine known as a purifier, which effects a separation on the basis of size of particles. In addition, a fan at the top of the purifier box draws an air current through the sieves, which lifts out light, fibrous particles. The purified middlings are then ground between smooth steel rollers and the ground material is bolted to remove the

fine particles of flour. Coarse fractions which failed to pass through the flour sieves are reground twice or three times. The flour produced by each regrinding of this material contains increasing proportions of fiber, ash, and soluble proteins, and becomes progressively darker in color. From this description of the process it is evident that a considerable number of flour streams will be found in a flour mill, one such stream resulting from each break and each middlings reduction. Not uncommonly twenty to twenty-five or more flour streams are thus available to the miller, and he may combine any or all of them to suit the demands of the trade.

While the individual flour streams may be bleached, the more common process when bleaching is resorted to is to treat the finished products with bleaching agents. The most common bleaching agents used in American mills are:

(1) Nitrogen peroxide, ordinarily generated in the mill by means of a flaming electric arc.

(2) Chlorine, which is usually purchased in a liquid form in steel drums, often mixed with small percentages of nitrosyl chloride. Chlorine is generated by the electrolytic process in a few mills. Occasionally, a double treatment with chlorine and anhydrous ammonia is resorted to.

(3) Nitrogen trichloride produced commercially by passing gaseous chlorine through a solution of ammonium sulfate.

(4) Benzoyl peroxide, added in mixture with acid calcium phosphate below the second break roll.

Numerous criteria of flour grades have been proposed by cereal chemists during the past half-century. Among these the following may be mentioned: (*a*) ash content, (*b*) pentosan content, (*c*) fat content, (*d*) fiber content, (*e*) titrable acidity of water extracts, (*f*) percentage of soluble proteins, (*g*) specific conductivity of water extracts, (*h*) buffer action of water extracts, (*i*) catalase activity, (*j*) relative proportion of branny particles, and (*k*) number of wheat hairs per unit of flour.

All the foregoing bear a negative correlation to the grade of flour—that is, the percentage or index increases with decreas-

ing grade or degree of refinement and commercial value. In addition to the items mentioned, flour grade is generally correlated with the color or visual appearance of dry flour, of dough made therefrom, and of the baked bread. The appearance of the crumb of baked bread is extensively used in cereal laboratories as an index of flour grade. The color which results on wetting the flour is used in a crude way by millers and milling chemists in what is known as the Pekar test. This test has been made more or less quantitative by measuring the relative extent of color change per unit of time in the freshly wetted material.

Bread as a Moist Food

AMONG organizations of women the Housewives' League is one apart and peculiar unto itself. When the war was at its height in its effect on prices, Mrs. Julian Heath, of this League, brought to a woman's meeting in New York a loaf of 5-cent bread. She had herself photographed with it in her hand and started a battle cry that all bakers not selling such a loaf were pillagers.

Mrs. Louis Reed Welzmilller, deputy commissioner of markets of New York City was among those present. She moved that an investigating committee be named to find out the truth, and as a first move asked Mrs. Heath to name the baker of her loaf.

The baker admitted, when visited by Mrs. Welzmilller, that he had bought a bankrupt bakery only a few weeks prior to selling this loaf to Mrs. Heath, and that being a pie baker without interest in bread, he proposed to bake up as quickly as possible and dispose of it, all flour not suited to pie-crust use. He had conceived the idea of selling 5-cent loaves as a sensational trade-getter and he had a rule of one loaf only to a customer, who must also take 50-cents worth of pies or sweet goods.

Mrs. Welzmilller thereupon came out with a statement of the truth of the case with an exposition for housewives of the vast difference in quality in breads of different types and of the greater nutritional value of breads rich in milk solids such as those commanding the New York market.

Another woman, also a member of Mrs. Heath's organization, is now seeking public opportunities to condemn "steam bread" whatever that may be. She is claiming baker's bread is too moist for her husband's use and a doctor has told her so.

"Won't you be good enough to tell me what steamed bread is?" wrote Dr. H. E. Barnard to the lady who thus states the case for the Housewives' League, so-called, "as in more than twenty years' experience as a food official I never heard of anybody being able to buy that kind of bread.

"And isn't the point that bakers' bread is too moist rather illogical? Certainly it is not as moist as bread and milk, or breakfast food served with milk, or mashed potato, or bread pudding, or ice cream. I have never heard that the human stomach was unfitted to handle moist foods. Indeed, liquid foods are usually served to invalids. Why, do you suppose, is it that fresh bread is too moist for persons in normal health, while for little children and invalids bread soaked in milk, or cereals cooked as gruels are recommended?"

The reply of the lady to whom Dr. Barnard's letter was addressed is being awaited with considerable interest. The laboratory as a testing place for truth is now well established; the bakers have their own at the American Institute and the universities are enlarging this field constantly. Its replies to ancient adages about food are eliminating them one by one, and sometimes in wholesale lots.

Telling the Story

HOW can the baker go past the groups who stand between him and the ultimate consumer of his baked goods, and get his story right across the dinner table in his customer's home?

The Hastings Bread Co., of Brockton, Mass., accomplished the feat in an interesting manner. It published on handsome plate paper, 17 inches wide by 28 inches long, a display of bakery photographs, with a text telling of the bakery's products—bread, box cakes, box doughnuts, lady fingers, wedding cake, patty shells, birthday cake, and the like.

The reverse side of the poster told the story of baking and delivering 20,000 loaves of bread a day, showed a picture of the company's plant, from the outside, and contained various paragraphs from the Gospel of Cleanliness as practised in the plant.

"Cleanliness comes first," announces this progressive company, "for cleanliness is the most important consideration in making good bread. And there is plenty of room in our bakery to work in. The arrangements are planned so that the bread moves along steadily from flour-bag to wrapper with no waste motion."

Any baker who plans a mailing folder to send into the home of his customers and potential customers might do well to send to the Hastings Bakery, Brockton, Mass., for a copy of their very successful folder. It might suggest a plan applicable anywhere as well as in this one community.

I hope that the food interests will rally around the American Institute, and give your association every opportunity to carry on the good work that the Wheat Council inaugurated.

—H. A. Lane, Secretary,

Joint Committee for Business Development.

Bread in Japan

IN THE Imperial Japanese army they bake bread by methods perhaps as up to date as in any army in the world. Five traveling ovens baked bread for the soldiers prior to the earthquake of last year. Three were destroyed in the quake but are being rebuilt for future service. Major S. Marumoto of the Japanese Army was a recent visitor at the American Institute. He spoke interestingly of two ovens he had invented for use of the military forces of his country,—one for field baking and one for garrison baking. He hopes to organize reserve baking companies for the Japanese similar to those organized recently in America by Major Robert Littlejohn of the U. S. Army's School of Subsistence. He also believes Japanese bakers need badly the same Institute service that has been opened to American bakers through research work conducted here. A Japanese student is promised for our next baking course. This will expand the range of the Institute work, as students have already registered from Canada, England, India, China and Mexico. All have taken back with them modern ideas of bread making based on modern machines and methods of fermentation control.

I think every baker in the land ought to make it a point to visit the Institute, spending at least one whole day going through the different departments and hearing your people explain their work. You are helping, in spite of themselves, many, many bakers who have no idea of your work. I wish I could set down the results of my visit in such a way as to show the dairy people what you are doing to bring about full co-operation between your industry and theirs.

—Craddock Goins,

Editor, the Milk Dealer, Milwaukee, Wis.

An Adulterated Product

It is Offered for Registration at This Institute and is Rejected for Cause

By C. B. MORISON

Research Department, American Institute of Baking

ABOUT four months ago a product claimed by the manufacturer to be "100 per cent pure baker's powdered malt" was sent to the Institute for examination in connection with a request for its registration as a reliable baking ingredient.

According to those responsible for its manufacture and sale this 100 per cent pure article was "Made from the Honeycomb of the highest grade of Malt. The life principle of the barley grain germinated and processed to insure greater concentrated power, guaranteed uniform strength." "Results from baking show: a richness in flavor, color and aroma never before obtained from malt and the thin golden brown crust makes its own silent appeal."

When a baking ingredient is advertised with the superlatives of a circus press agent the Institute is rather more than interested in determining whether or not such panegyrics are justified.

In the case of this "100 per cent" pure product the manufacturer ingenuously furnished us with original samples direct from the home office so that the identity of the sample as the genuine article was clearly established at the beginning of our investigation.

After considerable time had been spent in attempting to isolate the "life principle" referred to in the advertisement, the writer and Mr. Luckow of the Analytical Laboratory were able to unravel a tangled skein of vitalistic elements which appeared to be nothing more than coal tar dyes, cane sugar and dried malt extract. The writer found that this "100

per cent" pure product contained four coal tar dyes, and was able to isolate and identify two of them known as Tartrazine and Orange I. Both of these dyes are permitted colors, but their presence must be indicated on the label in order to conform to the law.

The sample contained 27.2 per cent of cane sugar as determined by the Clerget method. Since malt extracts do not normally contain cane sugar, the "100 per cent pure baker's powdered malt" is a mechanical mixture of a dried malt extract and cane sugar. A summary of the analysis is as follows:

Moisture	4.17%
Total Solids	95.83
	<hr/>
	100.00

Sugar

Before inversion, reducing sugars
as dextrose31.14%
After inversion, reducing sugars
as dextrose64.20%
Sucrose or cane sugar by Clerget..27.20%
Maltose, dextrose, and sucrose present.
Maltose and dextrose were not determined separately.

Dextrin	7.32%
Protein (N X6.25).....	1.58%
Ash	1.11%
Diastatic value Lintner..	5.00%

Coal tar dyes, Tartrazine and Orange I present.

The above analysis indicates that the product claimed to be "100 per cent pure baker's powdered malt" is a mixture of dried malt extract and cane sugar colored with coal tar dyes. It is adulterated and misbranded and possesses

no special properties for the production of "richness in flavor, color and aroma never before obtained from malt," that cannot be obtained with ordinary malt extracts and syrups.

It is "guaranteed not to harden, cake or weevil under the heat of the bake shop" by the manufacturer. Samples of this product exposed to the ordinary temperatures and humidities of the laboratory are hygroscopic and set to a hard candy like mass in a few weeks. We have one sample now which has hardened into a yellow mass which cannot be removed from the container without difficulty and the granular character is entirely lost.

It is apparent that all samples of baking ingredients sold under extravagant and misleading claims should be thoroughly investigated before purchase. In addition to the possibility that such products are flagrant violations of the Food Laws, they are usually sold at a high price and contain common materials which are less expensive and more efficient when bought and used in the ordinary way.

It is obvious that this "100 per cent pure Baker's Malt" will not be registered by the Institute and that the Federal food inspection authorities will handle this product as is customary in such cases.

Industries At Work

WHEN law makers, muck-rakers, politicians and others sit down in the seats of the mighty to handle the baking industry on a pitch fork, it is not Mr. Jones' bakery or Mr. Williams' bakery they think of. They think of the baking industry as one of the family of industries and of its practises as a whole.

It was because members of the industry saw this that they reared the American Institute of Baking to handle those matters that can only be handled as a whole,

and that affect the fittin-in of the baking industry to the industrial family of America.

Now comes the "Nation's Business" with a splendid story of the phenomenal growth of certain industries due to "co-operative advertising." It is the kind of advertising in which the meat men have joined with the bread men, the butter men with the bread men, the milk men with the butter men and the bread men, and the flour and yeast men with all of these.

The case of the Southern Pine Association is held up in The Nation's Business as typical. Here was an industry whose individual members sold pine for their own accounts. Yet they knew that to sell pine lumber they must first have buyers who were "well sold on the use of pine." The Association spread the gospel of Southern pine for every conceivable purpose. Inquiries rolled in from all parts of the world. New orders followed the inquiries.

"If your business," concludes the writer in Editor Merle Thorpe's excellent publication, "**can render a public service this service can be successfully advertised in co-operation with other members of your industry. And a business that does not render a public service has no business being a business.**"

A Monument to Build

I learn that some of the diners at the St. Francis hotel call for whole wheat bread. I didn't know there were many well informed diners in any hotel in the world. The world do move. If you bakers will start a movement to erect a National memorial to Dr. Graham (developer of Graham bread) on the Smithsonian grounds at Washington, D. C., I crave the privilege of joining the congregation.

—Harvey W. Wiley.

Much Ado About Bacteria

How Housewife Becomes Alarmed at Appearance of Spots and Mold Growths on Her Food Products

By HAROLD E. TURLEY

Bacteriologist, American Institute of Baking

THE housewife is always ready to point an accusing finger at the baker on the slightest pretext. Of course, the baker is responsible for any defects in the quality of the loaf, when they appear. However, the baker gets the blame for mold spots and various colored spots when they appear on bread, regardless of his responsibility for their presence. The charges put forth by the housewife are often of a very serious nature, such as, "One of your girls spilled face powder in the dough," and "you have poisoned my entire family."

The baker, not knowing the cause of some of these spots, is often very much perplexed when these accusations are made. The fact that a baker has not been troubled with these false imputations does not mean that he will never have such an experience. A detailed discussion of some of these defects will enable the baker to meet these accusations with a broadside of remarks as to the nature of some of such spots.

Spots of various colors sometimes appear on the inside of the loaf. These spots are very undesirable from the consumer's point of view and are of immense importance to the baker from the standpoint of control and recognition of the trouble. It is known that certain bacteria are capable of producing such pigments as red, yellow, green, black, blue, and purple. Such foodstuffs as milk, fish, cheese, potatoes and preserves have been subject to the attack of these color producing bacteria. Color spots on fish caused a loss of thousands of dollars to the dried fish industry until science came

along recommending treatment with salt and borax. So the baker is not the only one who has his troubles with colored spots.

As far as the writer has been able to learn, and from the results of other observers, the colored spots on the inside of the loaf are mostly caused by dyes getting into the flour from the printing on the sacks. These spots usually occur as small specks in the loaf, but, at times appear as streaks of red, green, blue or purple. These colored areas do not contain cottony mold threads, and are not to be confused with spots of mold that have developed on the outside of the loaf and then have grown inward. The spots produced by dyes are not a common source of annoyance, but when they do appear it is well to be able to recognize them. The dyes are harmless. The spots are unsightly, but the housewife must not become alarmed and think some baker is trying to poison her.

As reported in the National Association Review for September 22, 1922, purple spots have been artificially produced in bread by scraping some dye from some purple letters on a flour sack and transferring it to the flour. In most cases the same type of dye as found on the flour sacks is used in flavoring extracts and food colors. Therefore, let us not blaspheme bakers' bread when in a few instances harmless colored spots appear.

Red bacterial spots appear on the outside of the loaf in extremely rare instances. These red spots sometimes occur in streaks. From its appearance,

the disease became known as bleeding bread, wunderblut, and blood rain. The disease is caused by a short rod bacterium and only appears in warm, damp weather. Bleeding bread has only been observed at the Institute three times in the past two years. Scientists agree that the organism is harmless to the human body. The writer can further assure the bakers and housewives of America that these spots need cause no alarm, for he has eaten patches of bread affected with this disease.

The bakers and bread consumers of the world are more concerned with spots of mold on bread than spots caused by dyes and bacteria.

Red Bacterial Spots

When the word microbe is mentioned one usually associates the word with a "bug" that causes a great deal of woe and distress to the people of the world, but all of the micro-organisms in the world are not "black sheep." In fact, most of them are beneficial. We could go into detail showing how the various yeasts, bacteria and molds are a benefit to mankind, but for the present we are confronted with the question—are the molds of bread harmful to the human body?

Out of the numerous types of mold we shall discuss the most common ones that attack bread.

As far as the writer has been able to learn there are only two molds from the entire list that will produce harmful results when eaten, namely: *Rhizopus nigricans*, whiskers, and *Aspergillus niger* (black mold). These molds will produce illness if eaten in quantity. But what person is going to continue eating a piece of bread if it has a musty or sour taste? Both of these molds have their warning signals in that they produce mustiness and sourness in bread.

The mold "whiskers" is identified by its heavy, felt-like cottony growth on the

outside of the loaf. When it first appears it is white. Later it changes to a gray, grayish brown, and finally to a brown felt-like growth. Embedded in this heavy mass of threads are the black sporangia or spore pods of this mold that are ever ready to release thousands and millions of spores to infect new bread.

Aspergillus niger or black mold is noticed as a brown to black sooty growth on the surface of the bread. It is a low growing mold and is easily distinguished from the cottony-like growth of "whiskers."

The common bread molds such as blue mold, green and orange molds are not harmful to the human body.

Penicillium, or as it is known by its common name of blue mold, is known to every baker and American housewife. It is found on bread, jams, fruit and is even found growing on old shoes lying about the basement. The color varies from a light blue to bluish gray, bluish green, and yellowish green. The spores are born on stalks arising from the threads of mold in a whisk broom fashion.

The *Aspergillus flavus* type of mold produces such a short rich green growth that it reminds one of a bright green carpet, or a bed of mold plants. The color is usually a bright rich green, being easily distinguishable from other forms of mold.

The Orange Molds

Orange mold usually caused by *Monilia* is not quite as well known as the other types of mold. The color varies from a pink to a salmon and orange. It sometimes has the habit of producing little growth on the outside of the loaf, and developing inward producing spores and a pink to orange colored mass inside. This condition is sometimes aided by the start of a mold growth in the crack of a slit-top loaf and followed by an inward development. Some very interesting

examples of how ready the housewife is to accuse the baker have developed from experiences with the peculiarities of this mold.

Face Powder Confusion

A baker in the South was confronted with the following accusation. "Now, Mr. Jones," said a lady customer, "I have been using your bread for a long time and I like it very much, but recently I noticed a loaf of your bread that contained facepowder. One of your girls must have spilled face powder in the dough. If it happens again I shall stop using your bread." What was the poor baker to do? He did not know that it was mold and he did not know of some of the peculiar habits of this type of mold.

I shall have to admit that I have seen loaves of bread affected with this mold that had the appearance of having contained face powder. However, upon closer observation, one can see mold threads in this pink to orange colored area. No baker is immune from such accusations. Therefore it is imperative that every baker in America stop regarding mold as just some "colored stuff" on his bread, and really take some time to learn the nature and appearance of the various types of mold.

Orange mold caused a different form of trouble for a Michigan baker. A letter from this baker reads: "We are sending today via parcel post several pieces of bread which you will find moldy in the center. These were returned to us by a customer who claims illness to the entire family resulted from eating a part of the loaf. We are anxious to determine if its condition could contribute to the claim mentioned."

The mold on the above pieces of bread was of the orange variety. This particular mold is used by the natives of Java

to mold the earth-nut. These moldy earth-nuts are considered a delicacy by the natives, so it is ridiculous to regard this mold as a menace to health. The writer has eaten practically every bread mold with the exception of "whiskers" and black mold. Before the housewife starts accusing the baker of sending bread to her that is poisonous, she had better check over her menu and see if it was not lobster salad that produced illness in her family.

From the foregoing it can be seen that most bread molds are harmless to the human body. Regardless of the harmless nature of most of our bread molds, we are confronted with the question: is the baker always responsible for the consumer's moldy bread? Emphatically—he is not.

Molds are microscopic plants that consist of masses of long slender vegetative threads. Stalks arise from these threads on which are born spores. Mold spores are the "seeds" of the mold plant. The spores are very minute, about one fifteen thousandth of an inch in diameter. Just think for a moment how easy it is for a dandelion seed to be carried in the air currents and then one can realize how much easier it is for a mold spore to be carried on dust particles and in the air. A patch of mold as large around as a dime can produce thousands and thousands of spores. Mold spores are present in the air, in particles of dust on the walls, and in fact, they are present everywhere around us.

Sharing Responsibility

Molds like warmth, food material, moisture, dark places, and as a rule, acid conditions for growth. No matter how sanitary may be the loaf of bread from the baker, the loaf is going to become moldy if stored in a damp, unsanitary bread case in the grocery store. But who gets the blame for the moldy loaf of

bread—the baker, of course. **All grocers should be educated as to the nature of mold infection and should be taught to place their bread in a clean, dry case.** The housewife is as much to blame as the groceryman when she places her bread in a damp, dirty bread box. This box should be cleaned frequently with a good disinfectant which may be any commercial disinfectant containing sodium hypochlorite. After this is used a little boiled water will wash away all traces of the sterilizing agent. But the housewife must be cautioned not to trust too implicitly to cleansing fluids and give up the use of elbow grease.

Where any disease organism has found a spot where it can breed for a sufficiently long period, which, in point of actual time, may be a very few hours under favorable conditions, there will probably be found agglomerations which will not be killed by a fluid passing over them quietly. They will have to be disturbed or disintegrated by physical action. This calls for liberal use of the scrubbing brush.

Before the housewife blasphemes the baker for moldy bread, she had better look first as to the sanitary conditions of her own bread box and the grocery where she is purchasing her bread. Also the housewife should learn the nature of some of the bread molds, and the nature of some of the spots that may occur in bread on rare occasions before she accuses the baker of trying to poison her.

Bread and Malnutrition

WHAT place in the diet will bread finally achieve, as the various scientists at work on human nutrition add up and subtract the list of really essential foods? The richer the bread in milk solids, of course, the higher will be its assignment in the food list.

Frank O. Kruh, of the Soldan High School, St. Louis, presents a typical example of the kind of investigators who need to receive all the information about bread as an energy food, and about the foods necessary to supplement it for a balanced ration, that scientists and nutrition experts can furnish.

Mr. Kruh has organized a class in St. Louis to hear nightly lectures on malnutrition. His class now has about fifty students in it. He has told them of malnutrition as a cause of scurvy and rickets, and of its general prevalence among St. Louis school children.

"We are much concerned," writes Mr. Kruh to the American Institute, "with presenting the sort of information that will teach the public how to understand the close relation existing between the proper choice of foods and the physical well being of both children and adults. The subject of bread's place with relationship to other foods is one that frequently comes up for discussion and for that reason I shall welcome any literature that will assist me in answering questions intelligently. Meanwhile I shall be glad to read your Institute magazine and become acquainted with the nutritional work of your industry."

Multiply this one case of alert interest in the nutrition of city children by the number of cities in America and you will see one of the major opportunities for the baking industry, through its Institute, to prepare bread's case for vast groups anxious to know what the latest light on baking is.

A day spent in Chicago at the American Institute will convince anyone of the necessity of belonging to American Bakers Association.

—C. P. EHLERS, Secretary, Indiana State Bakers Association.

Towards A Complete Food

Experiments at American Institute Show Bread's Increasing Value in the Diet

By ROSCOE H. SHAW

Chief, Department of Nutrition, American Institute of Baking

If an apple a day keeps the doctor away, but, when fed alone, brings the undertaker within two weeks, shall we say that apples are poison? Hundreds of so-called nutrition experts have flared out just so against white bread, on evidence that, to find white bread guilty must also find apples guilty, spinach guilty, potatoes guilty, eggs guilty. Here is told the story of the individual contribution of certain foods to that composite whole which the American food consumer designates as a "square meal." Until restaurants can advertise "meals" and then set before their customers slices of dry bread alone, either whole wheat or otherwise, the great furore over bread is, of course, pointless in practice. But it has kept certain groups busier than any other food controversy of our day. This article by Roscoe H. Shaw throws new light on the issue. It is written for bread consumers and for bakers to whom their issues are constantly carried in controversy.

FROM time to time rumors have gone the rounds that bread is not as good a food as it is supposed to be; that it lacks some of the things that we require of a food. Not long ago there appeared a report that white rats, fed solely on white bread in which water was the only liquid ingredient that entered its makeup, not only failed to grow, but lived only a short time. There was nothing particularly startling in this. From the standpoint of our newer knowledge of nutrition we know that such bread is deficient in some of the essentials that promote growth or even sustain life itself. We know that it is weak in proteins and that even those present are lacking in variety. We know too that it is lacking in mineral salts and an adequate supply of those mysterious but absolutely necessary "somethings" that for the want of a better name are called vitamins.

There is no use in denying that this report did some injury to the baking industry. It fell into the hands of readers who are wont to form hasty conclusions without the process of reasoning customary with others. They became prejudiced against bread. "Surely," said they, "if

bread is not a good food for rats; if they die when fed upon it, it cannot be a fit food for humans. If bread will not promote growth in young rats it will not do so for children."

Happily, such arguments against bread are very easily answered. In the first place it must be remembered that the bread on which the rats in question were fed was made with water; no milk entered its composition. When rats are fed on bread made with milk instead of water they not only grow in practically a normal manner, but attain a ripe old age. When even a small proportion of the water is substituted with milk a remarkable difference is noted in the growth of the rats. Bread made with water is fast being replaced with bread in which milk takes a prominent place. A comparatively small percentage of bread made with water is now sold in this country.

Progressive bakers generally are convinced that all bread should contain milk and many believe that until it does bread made with water should be so labelled that the consumer will know that he is

getting an article of less complete nutritional value than if made with milk.

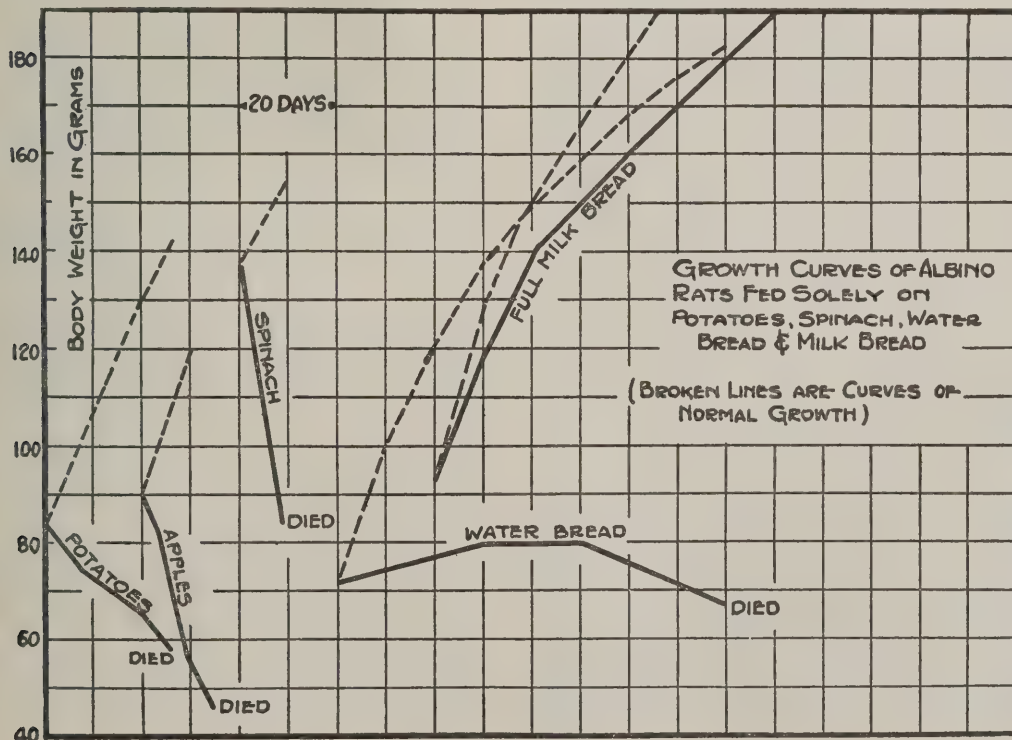
In the second place, it is rare indeed that bread is eaten unaccompanied with some other food; even the spread of butter adds an important vitamin. Our diet is usually such a diversified one that there is small cause for worry that under ordinary circumstances we will not receive all the food essentials; what one particular article of food may lack is supplied by another.

Perhaps few realize that there are indeed few articles of food complete in themselves. Milk is, of course, one of these, but even milk, while a complete food for the young child, is lacking in at least one essential required by healthy adults. However much milk is heralded, none of us would care to live on it alone. Potatoes, while not in the same class as milk, are almost universally used as an article of food in this country, yet except in case of famine, they would rarely be

eaten unless supplemented by other foods. We enjoy a good beef steak, yet we would hardly think of eating beefsteak alone even for a single meal. We might go down the entire list of human foods and not find a single one that under normal circumstances we would care to consider a meal by itself. We could hardly expect to find one in the list that would meet all the needs of the body. It is only when combinations of food are taken into the stomach that all the requirements are satisfied.

Department of Nutrition

With the opening of the Institute work at Chicago a Department of Nutrition was established for the purpose of making nutritional studies of problems pertaining to the baking industry, and it was decided to carry on feeding tests to compare the nutritional value of bread with that of some of the other more common foods. A list of some dozen of the



ordinary food articles was therefore selected. These foods were fed individually to young white rats and the effect on growth and length of life noted as compared with similar rats fed bread under the same conditions. It was not the purpose of this feeding test to bring out anything particularly new or add anything to our knowledge of nutrition. The foods selected are all well known and their nutritional value thoroughly established. They have not, however, been studied in direct comparison with bread. It was our purpose to show the baker how, from a nutritional standpoint, his bread compares with some of the other every day articles of food and to place in his hands a defensive weapon should he have occasion to use it against an attack on his product.

On an Apple Diet

The feeding test was conducted in the conventional manner. Young rats between 40 and 50 days old were selected and placed in separate cages. In addition to the particular food they received there was always fresh water available to them. This water was Lake Michigan water as supplied by the city of Chicago. In the cases reported in this paper, however, very little water was drunk except when bread was fed because water comprised a very considerable percentage of the food eaten. The rats were under close observation and were weighed at frequent intervals. The apples were of the ordinary cooking variety and were fed to the rats very much as they are usually eaten, i. e., the whole apple, including the skin, but not the core and seeds. The potatoes were fed raw. The peeling was removed in about the same way that a cook would remove it before boiling them. The spinach was of the cooked canned variety. The bread used in these tests was made in the bake shop of the insti-

tute according to standard formulas. The milk bread contained 8 per cent of its dry material as whole milk solids; in other words, it was equivalent to bread in which the entire liquid portion is whole milk. The bread was sliced, air dried and then ground in a mill.

The chart is self-explanatory. Each heavy line shows the growth of one representative rat in each group. The dotted line (curve of normal growth) shows how this rat should have grown had he received a food complete in all essentials. It will be noted that the rat receiving potatoes lived for 26 days. He weighed 84 grams at the beginning of the experiment and consistently lost in weight until his death when he weighed 59 grams. The rat fed on apples weighed 90 grams at the start. His growth curve shows even more precipitous a drop than does that of the potato rat. At death, which occurred after 15 days, he weighed 46 grams.

A Spinach Diet

Still more striking is the steep drop in the growth curve of the spinach rat. He started at 138 grams, lived on this diet but 9 days and weighed but 94 grams at the close. Turning now to the growth curve of the rat receiving bread made with water we note a considerable difference. This rat weighed 72 grams at the start, gained slightly for a time and then declined in weight to 68 grams. He died after having been on the diet for 79 days. The remarkable effect of milk in the bread is shown in the growth curve of the rat fed on whole milk bread. It will be noted that this rat gained consistently in weight, his growth curve following quite closely the curve of normal growth.

We may therefore conclude that while water bread is not a complete food, the three common and highly esteemed articles of food compared with it are even

less complete. The point, however, that is most impressive is the almost magical effect of milk on the nutritive value of the loaf.

The next issue of Baking Technology will contain a continuation of this paper showing the nutritive value of some others of the common articles of food as compared with bread.

The "Gummy Mass" Tradition

WHEN we consider that notions such as the notion that wheat should be planted at a certain angle of the moon persisted through countless generations before scientific agriculture displaced them, shall we complain about a simple little notion such as the one that "fresh bread forms a gummy mass in the stomach and causes digestive trouble?"

This little statement has been repeated year after year by young lady nutrition workers who heard it from somebody who put it in a school-room lecture.

It was repeated again before a Congressional committee during a public hearing on the Brand Bread Bill. And now the young lady who gave that testimony is possibly engaged in running down the source of the curious old canard about bread. She has been invited, at least, to help us do so.

As soon as her testimony had been recorded Dr. H. E. Barnard, director of the American Institute, sent this missive to the witness:

"Every once in a while this allegation that bread forms a gummy mass in the stomach rises up to confuse us. Won't you be so good as to tell us where you came in contact with the idea that bread forms gummy, indigestible masses in the stomach? What physiological or chemical reason is there for the belief that the digestive fluids will not handle in a nor-

mal and satisfactory manner any bread masses that they may encounter?

"What possible difference can there be between "gummy bread masses" and "gummy oat meal masses," or 'potato masses, or pudding masses, or any starchy masses. Indeed, are not all of our starchy foods more "gummy" than bread? Certainly in the amount of moisture present they go far beyond bread. Won't you please help us to trace this "gummy" stuff to its source? And when we get there won't we find it but a notion like strawberry birth marks, and planting potatoes in the light (or is it the dark?) of the moon?"

How to Work

AFTER years of disunion and dispersion the bakers in Washington State are developing a real state association. Its members have learned to forego the desire to see only evil in rivals, and to work under a "majority rule," for policies that are once adopted.

"Let's put all we've got into every labor the Association undertakes," writes C. W. Van Rooy, secretary, "and if differences of opinion arise, as they must in all human affairs, let us differ openly, frankly, honestly. Let's always have our cards on the table.

"And then let's have a gallant minority ready and willing to forget defeat and stand shoulder to shoulder with the majority in a united effort to realize the ultimate in success for every undertaking

The Washington State bakers petitioned the American Association to open a correspondence course in baking that a baker on the job at home could study, using his own bakery for his laboratory. They also urged that all state members join their National "as past experience had shown that those who had joined got more out of it than they put in, and were satisfied that their membership paid."

Composition of Materials

What is in the Salt Used by Bakers as Shown by Laboratory Tests

By C. B. MORISON

An important feature of the work of American Institute of Baking is the critical study of all ingredients that are offered to or used by the baker. The three questions asked concerning every baking material are:

1. Does it comply with all State and Federal Laws as to its composition?
2. Is it properly labeled and advertised?
3. Is it sold at a fair price?

In a series of articles, of which this is the first, Baking Technology will publish the results of the study of many baking materials. The current article deals with salt.

AS a result of the laboratory examination of many samples of various baking ingredients sent to the American Institute of Baking by members and others, considerable analytical data on the composition of these products has been obtained. This data is probably fairly representative of the composition of the baking ingredients offered to the baker, since it is based on the results of actual analysis of samples sent to the Institute by members from all sections of the country. It should, therefore, include analyses of baking ingredients from a wide variety of commercial and manufacturing sources.

Many of the samples of baking ingredients received by the Institute for examination and analysis are not marked with their distinctive trade or brand names or shipped in the original packages or container. These samples are sent under special identification marks, letters, numbers or symbols which do not disclose their brand or trade name. In such cases the Institute has no direct information as to the commercial name or manufacturing origin of the sample, and the results are reported to the member under the Institute laboratory sample number and the corresponding special identification mark.

Other samples are received under their distinctive trade or brand names, and

some in the original packages or containers. Samples examined for registration must be shipped in original packages by the manufacturer or obtained on the open market by the Institute.

All samples of whatever origin are examined in the laboratories under the consecutive numbering system generally employed in control or analytical work. In the following report on the composition of baking ingredients, according to the analytical data obtained by the Institute, the samples will be designated by number, and not by their commercial or brand names. The results reported have been assembled from analyses of the various classes of baking ingredients such as salt, carbohydrate products, malt extracts and syrups, milk products, shortening agents and others.

Salt

The following compilation of analytical data from the analyses of twenty-seven samples of salt, is reported as the first paper of the series which is intended to present a fairly representative and comprehensive survey of the compilation of bread making ingredients as determined in our laboratories. Most of the analyses of the baking ingredients found in text books and reported in general articles are the result of the compilation of old analyses and are thus not fairly repre-

sentative in the light of recent improvements in method and products.

Moisture—The moisture content of twenty-seven samples of salt ranged from 0.01% to 0.47%. Eighteen samples contained from 0.01% to 0.12% moisture; average 0.07%. Six samples, 0.16%-0.23%; average 0.20%. Three samples, 0.28%, 0.46% and 0.47%, respectively.

Insoluble in Water—The water insoluble material ranged from 0.00% to 0.98%. Twenty-three samples from 0.00% to 0.07%; average 0.02%. Three samples contained 0.13%, 0.13% and 0.14% water insoluble material, respectively, and one sample, 0.98%. The latter abnormal amount was largely due to the presence of insoluble magnesium carbonate.

Total Sodium Chloride—The total sodium chloride varied from 97.45% to 99.94%; the latter figure was obtained from a sample of exceptional purity. Nine samples from 97.45% to 98.97%; average 98.35%. Eighteen samples contained from 99.02% to 99.94%; average 99.49%.

Calcium Sulfate—The amount of calcium sulfate ranged from 0.02% to 1.77%. Eleven samples from 0.02% to 0.26%; average 0.14%. Nine samples from 0.29% to 0.58%; average 0.40%. Three samples contained 0.73%, 0.61%, 0.87%, respectively, and four samples 1.02%, 1.27%, 1.50% and 1.77%.

Calcium Chloride—The calcium chloride ranged from 0.01% to 0.15%. Twenty-two samples from 0.01% to 0.10%; average 0.05%. Five samples from 0.11% to 0.15%; average 0.13%.

Magnesium Chloride—The magnesium chloride ranged from 0.00% to 0.14%. Twenty-six samples from 0.00% to 0.09%; average 0.03%. One sample contained 0.14%.

Magnesium Sulfate—One sample contained 0.12% magnesium sulfate.

Calcium and Magnesium Carbonates—One sample contained 0.04% calcium car-

bonate. One sample contained 0.34% magnesium carbonate.

Phosphates—Two samples contained 0.002% and 0.007% of phosphorus pentoxide, respectively, in combination as calcium phosphate.

Iron and Aluminum Oxides—The iron and aluminum oxides varied from 0.00% to 0.20% in fourteen samples. Ten samples from 0.00% to 0.06%; average 0.01%. Three samples 0.18%, 0.19%, 0.20%, respectively.

Standards

According to "Standards of Purity for Food Products," U. S. Department of Agriculture, Circular 136, 1919, page 21, "Table salt, dairy salt, is fine-grained crystalline salt containing on a water free basis, not more than one and four-tenths per cent (1.4%) of calcium sulfate (CaSO_4), nor more than five-tenths per cent (0.5%) of calcium and magnesium chlorides (CaCl_2 and MgCl_2), nor more than one-tenth per cent (0.1%) of matter insoluble in water."

The highest amounts of calcium sulfate found was 1.50% and 1.77%, respectively, for samples No. 685 with a moisture content of 0.19%, and No. 1624 with a moisture content of 0.46%. Reduced to a water free basis the calcium sulfate is 1.5% and 1.78%, respectively, which is too high to agree with the Federal standard.

The total calcium and magnesium chlorides reported was below 0.5%, as required by the Federal standard.

The water insoluble material conformed to the Federal standard in twenty-three samples. The abnormally high insoluble matter 0.98% reported in one sample was largely due to magnesium carbonate.

The Federal standard applies only to the product sold as salt. There are present on the market a number of brands of table salt to which inorganic compounds

such as magnesium carbonate, magnesium silicate, calcium phosphate, and others are added as drying agents for the purpose of preventing caking and insuring a free running salt. Such brands of salt must be plainly labelled to show the presence and the nature of such added material in order to comply with the Federal law.

Salt intended for use in baking should not contain over 0.1% insoluble matter on a water free basis. The presence of high amounts of magnesium or calcium carbonate tends to exert a retarding influence on the normal development of the acidity of the dough. The total sodium chloride should be well over 99%, and the total calcium and magnesium chlorides less than 0.5%. Since all of the samples reported contained much less than this amount, there should be no difficulty in securing salt with a minimum of the latter constituents. The calcium sulfate content should be much less than the 1.4% required by the standard, since the presence of larger amounts of this constituent would reduce the total sodium chloride.

The physical condition of the salt especially in regard to color and size of particles was satisfactory except in a few cases. Four samples were examined that had a yellowish or reddish tint due to the presence of iron. This salt was not suitable for bread making. The size of the particles or granulation was satisfactory in most of the samples.

The addition of 0.02% of sodium iodide to salt for the purpose of increasing the amount of available iodine in sections of the country where goitre is prevalent has been advocated by certain health authorities notably in Michigan. The use of salt containing iodine has also been suggested in bread making. Therapeutic breads containing iodine are well known, and

their formulas have been the subject of patents chiefly in France.

Analytical methods for the examination of salt have been recently adopted by the American Association of Official Agricultural Chemists and will be published in the forthcoming revision of their *Methods of Analysis*.

In drawing specifications for salt suitable for use in baking, the essential requirements are minimum moisture content, water insoluble matter and calcium and magnesium chlorides. The amount of calcium sulfate should be well below the Federal standard of 1.4% on the water free basis. It is evident from our analysis that a high grade of salt can be easily obtained with a total sodium chloride content of well over 99%, and calcium sulfate below 0.50%.

The presence of barium is probably of little practical importance as recent analyses have shown negative results for this element. The Federal and State Food and Drug laws have greatly reduced the possibility of any high degree of contamination from barium compounds which have been reported as present in the salt brines of certain salt producing regions.

Salt which contains large amounts of inorganic compounds other than sodium chloride partake of the nature of so-called commercial "yeast foods" and "bread improvers." Such products cannot be sold as salt within the meaning of the Federal law as the standard refers to a purified product according to the limits of the definition.

Salt should be white and free from objectionable color. It should be composed of easily soluble particles, free from hard lumps, and dissolve freely in water without the separation of suspended matter.

The next paper of this series will be on the composition of malt products, extracts and syrups.

Two Letters

THE same mail brought us the following two letters. Because it would be utterly fatal for the baking industry to organize in a "tight little way for insiders" this magazine itself exists among other Association activities. It exists to broadcast the very kind of news that one of our correspondents finds hoarded up for the few. If any bakers wish to address their brother who wrote the first letter a communication in our care will reach him.

Your Association owes us nothing; we owe your Association nothing. Therefore we start at evens.

We were a member of the National Association of Master Bakers before the reorganization and were satisfied with the way the Association was then run. Since the new Association was formed for the benefit of a few large firms located in various sections of the country we and many other bakeries of our size and smaller ones were used as "runners up."

So long as the Association continues for the benefit of a few of the inner circle we are not interested in the success of the same or its undertakings. Until that time when you will take, or allow would be better, other bakers than the same favored ones on the inner circle, count us out. Very truly yours,

.....

I have watched the work of the American Association from war times up till now. I have only been in the game for myself for two years, but I have made good. I am sending you a sample of my bread to have same scored. I was very pleased to meet your Mr. Hall when he was here in Richmond. I only have a small shop now, but I hope to be located much better in the near future.

I was with Frank Middletown for nine and a half years. Please find my check for my dues. —Guy M. Weeks.

At Fair Harvard

HAVE the young men who graduate from college nowadays outgrown the cartoonists' conception of them just as the bakers have? Whereas the cartoons depict the commencement orators in the act of offering economic cure-alls to the waiting world, a glimpse into a real Commencement Oration, shows us something different by far.

It is Charlton MacVeagh, class orator, holding the World's ear and while his Harvard audience listened, here are the words he said:

"As to our future, who can tell, or who would if he could? Whether we ally ourselves with those illustrious Smith gemini, Trade and Mark, and like their worthy ancestor, John, fare forth in search of new worlds, new Pocahontasi, and new coughs to conquer, or seek to make this present world safe for Plutocracy by 'building it up,' as a canvasser from door to door, for Father John's Medicine, or even as a Bond-bread-house salesman, show the world how 43,040 housewives made it—it matters little.

"Whether we prefer to represent this Mr. Pillsbury, who supplies the world with flour—the flour that blooms in the stove, tra la (and if eventually, why not now—lest the fatal flasks and flappers of an idle summer wean us from our firm resolve) or, as one of the Gold Dust Twins, represent that Mr. Pillsbury in his noble resolve to make the whole world clean, as well as safe, for Democracy—it rests for each one of us to decide. Or should we choose merely to keep our schoolgirl complexion, or shoot our Arrow cuffs and collars in the air, or contend for the award of the B. V. D.—who am I, that I should cast the first shoe?"

Books for the Baking Laboratory

PRACTICAL MILLING. Prof. B. W. Dedrick, head of Milling School, Pennsylvania State College. 600 pages with 400 illustrations. Published by the National Miller. Price \$10.

Here is a volume on milling that recognizes the fact that the miller must no longer be a miller merely, but must know what the baker expects from the milled product and what scientific data may help the miller to achieve the best results.

It is a modern work, not on the mills as our fathers knew them, but as our children will come to see what they amount to. Not all of the phases of milling could be mastered by any one man, so Prof. Dedrick called to his aid specialists in certain branches of the industry. For the chapters on cereal chemistry he invited in as collaborator Prof. G. A. Shuey of the Department of Agricultural Chemistry, Pennsylvania State College.

The book is one bakers could well afford to read as well as millers, for if the time has come when millers should know about baking, then the time, inversely, has come when bakers should know the problems attacked by those who have sold them flour. The book points the way to that conception of farming, milling, baking, merchandising, which treats all these factors as individual steps in the progress of the wheat from soil to consumer. It bespeaks the larger co-operation that is taking the place of the "dickering" of the "I sell you" and "you sell me" days in industry.

It is both a teacher of the fundamentals to the outsider and a guide and reference library for advanced millers. The first part of the book is devoted to flour and milling theory and practice. Then comes a section devoted to baking and cereal chemistry and finally a section on mill design and engineering.

The twenty-five chapter titles include such headings as Wheat as a Food Grain; Middlings Purification; Diagramming Mills; Fans and Dust Collectors; The Power Question; Flour Blending; Determining Moisture Content; Internal Combustion Engines; Transmission Appliances; and Flour Testing and Baking.

The language is plain, with an absence of confusing terms or involved explanations. The chapters on "Power" and "Practical Milling" embody some of the author's own research work, done after he left the milling industry to become a milling educator.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Further experiments with contaminated milling wheat. Anon. Agr. Gaz. N. S. Wales 34, 852 (1923); cf. C. A. 18, 298.—The objectionable flavors present in bread baked from wheat previously contaminated with 3% of Hexham Scent or Bokhara clover seed can be almost completely eliminated by treating the contaminated wheat, after removal of the weed seed, with 1% by weight of freshly burned lime in air-tight containers for one week.

K. D. Jacob.

Proteins of wheat bran. I. Isolation and elementary analyses of a globulin, albumin and prolamine. D. Breese Jones and C. E. F. Gersdorff. J. Biol. Chem., 58, 117-31 (1923).—"Three proteins, an albumin, a globulin, and an alcohol-solution protein, have been isolated from wheat bran. The bran, which originally was exceptionally clean, was rapidly washed in cold H₂O and immediately dried at a low temperature. In this way the greater part of the adhering particles of other portions of the wheat kernel was removed. The bran was then ground to a fine powder. This contained 17.25% of protein (N x 6.25). By successive exhaustive extractions with distilled H₂O, 4% NaCl, 70% alcohol, and 5% NaOH, 86.61% of the total protein of the bran was extracted. The per cents of proteins actually isolated, expressed in terms of the total proteins in the bran, were as follows: albumin, 16.64, globulin 13.62, alcohol-solution protein 31.01." Their average elementary per cent compositions were as follows, respectively, N 15.42, 17.76, 15.35; C 53.21, 53.43, 54.25; H 6.71, 7.40, 6.75; S 1.35, 0.91, 1.35.

A. P. Lothrop.

The vitamin content of raisins and raisin by-products. R. A. Dutcher and J. D. Duthouse. Pennsylvania Agricultural Experiment Station, Bull. 181, 18 (1923).—Raisins do not contain vitamin A in measurable amounts. Vitamin B is present in raisins and raisin seeds. Raisin-seed oil possesses no vitamin activity.

J. J. Skinner

Flour manufacture. C. H. Bailey. Ind. Eng. Chem. 15, 1217-8 (1923).—A description of the roller process is given. The common bleaching agents are mentioned. Among the criteria of flour grades proposed by cereal chemists are: ash content, pentosan content, fat content, fiber, titrable acidity of water extracts, percentage of soluble proteins, specific conductivity of water extracts, catalase activity, relative proportion of branny particles and number of wheat hairs per unit of flour. All bear a negative correlation to flour.

R. B.

Value of sweet potato flour in breadmaking. H. C. Gore. Ind. Eng. Chem. 15, 1238 (1923).—Sweet potato flour when used as a bread improver gives a substantial increase in the volume of a loaf.

Ruth Buchanan.

The growth of the food-flavoring industry. Melvin De Groote. Spice Mill, 46, 2335-8, 2350, 2537-40 (1923).—The mechanism of taste and odor phenomena is treated in detail. Scientific advances in the industry and the question of substitutes for EtOH are discussed.

C. W. Trigg.

Growth and reproduction upon simplified food supply. II. Influence of food upon mother and young during the lactation period. H. C. Sherman and M. Muhlfeld. Proc. Soc. Exptl. Biol. Med. 19, 76-7 (1912); cf. S. A. 16, 3504.—Increasing the amount of whole milk powder from $\frac{1}{6}$ to $\frac{1}{3}$ of a diet of milk powder and ground whole wheat caused an increase in the number of young rats produced, an increase in the number successfully suckled and a better maintenance of body weight by the mother.

C. V. B.

Patents

Treating flour with highly oxygenated compounds. H. C. J. H. Gelissen. U. S. 1,483,546, Feb. 12. Flour either after or preferably during the milling process is treated with a substance of the paraldehyde-ozonide class. The effects may be enhanced in some instances by intensive milling, use of ultra-violet rays or of steam or of warm air. Preferably the catalase and similarly acting enzymes in the material are destroyed, e. g., by the use of a very small amount of Cl insufficient to bleach the flour, in order to permit the fuller action of peroxidase in liberating nascent O in contact with the flour material. Among

the compounds which may be used are paraldehyde ozonides, perozonides, peroxozonides, ozonide peroxides or polymers of the ozonides and similar compounds. These substances may be used either alone or together with various peroxides and persalts which have been previously proposed for addition to flour. They may be incorporated with flour if desired after milling (e. g., in forming dough for bread-making) to bleach the flour and improve its baking properties.

Oiling surfaces of dough loaves or cooking utensils. P. W. Wilcox. U. S. 1,483,704, Feb. 12. Dough lumps for bread making or other food materials undergoing cooking on heated surfaces are prevented from adhering to the cooking surface by application of finely powdered hydrogenated cottonseed oil or similar material which melts during the cooking.

Diastatic preparations. F. B. Dehn. Brit. 207,225. A sirupy preparation useful in bread-making to increase the activity of the yeast, and in degumming silk, fiber, etc., and as a destarching agent in laundries is prepared by mixing glucose sirup with an extract obtained from the product of the growth of an enzyme-producing fungus on a cereal substance. A fungus of the genera *Aspergillus*, *Mucor* or *Penicillium*, and in particular, *Aspergillus oryzae* is cultivated upon a base of wheat bran, middlings, etc. The product is extracted with H₂O or other solvent. The extract is concentrated by evaporation below 50 degrees or otherwise and is mixed with glucose sirup.

Preserving bran. R. Schiff-Giorgini. Brit. 205,466. May 29, 1923. Bran is preserved by storing it in a closed chamber in which the air has been replaced by some inert gas; N and CCl₄ are stated to be suitable, but CO₂ is preferred. To free the bran from entangled air it is allowed to fall freely into the chamber which has been previously filled with the gas, preferably by upward displacement of the air.

Preserving flour and meal. M. Schoen. Brit. 203,661. July 5, 1923. Flour and meal are dried and packed in sealed receptacles in which the air has been replaced by inert gas such as N or C dioxide. The drying is effected at a low temperature, by a current of air or in *vacuo* and may take place in the storage receptacles, which are provided with an opening, which is afterward sealed, for the escape of air and moisture and the entrance of the inert gas.

Chill and Super Chill

AS this old world moves along, no field of endeavor is more interesting than that in which further and further applications are made of the Pasteur principles of food control.

The baker cools his bread before he wraps it to get it colder than the growing temperature for molds. "Cold numbs bacteria," was Pasteur's finding as preached by Tyndall to England, "and heat kills them."

They used to laugh at the owner of a bath tub as one indulging in luxury and pomposity. Now they know that keeping the body free from dust is the one way to keep it free from bacteria such as those that attacked the son of our President when they gained entrance through a broken blister on his foot.

That the same kind of creatures attempt to eat the flour in the bin, causing a disease we call rope, and the apples in the barrel, causing a disease we call "rot," is only coming into general recognition now. An enormous waste of apples in "dry" storage is now shut off through the abandonment of dry storage in favor of refrigeration. And the same is true of milk, which never could be merchandised except for refrigerated containers.

And now comes the latest of them all—a refrigerated wagon box that delivers ice cream cold and hard without any of that sloppy process called "icing the cans." There is in this wagon box no more of that slopping of brine on the chassis and spoiling of ice cream when the ice gives out. Brine pipes within the wagon box's construction keep the box ice cold—and any food can be transported that way. It is easy to see that many bakers' supplies will soon come to the baker's door in such refrigerated wagons

and will move right into a refrigerator in the plant. In the meantime this wagon enormously increases the availability of ice cream in scattered summer camps. Farmers who hate the bakers and consider them enemies to be flayed rather than appreciated in their place as the real merchandisers of the farmers' wheat in the form it is eaten, will please note this development in an industry that also springs from the farm. Until merchandising was intensively studied and new weapons to accomplish its ends were brought into play, the farmer's milk could not be put into service profitably to anybody and efforts to do it were characterized by enormous loss through spoilage rather than by any other conspicuous factor.

The dairy industry advances faster than, perhaps, any other industry at this hour, but you don't hear the dairymen flaying each effort to advance as the merchandising factors bring it forward.

I think the Institute is right in working to make bread better and we are glad to do what we can to co-operate with you. Yesterday we had photographs taken of sandwiches cut in different shapes. These will appear in the August number of the *Woman's Home Companion*. Another picture shows a loaf of bread and other foods all ready for an automobile picnic. So you see we are doing what we can to co-operate with you. I am quoting from your magazine frequently in syndicated articles which appear in the *Chicago Daily News* and in other papers.

—Alice Bradley,
Principal, Miss Farmer's School of Cookery,
Boston, Mass.

BAKING TECHNOLOGY

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in Baking*



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Our Gathering By the Sea

UNIVERSITY OF ILLINOIS

EVERY baker who ever sold a loaf of bread knows that the successful methods of selling are now in a state of abrupt change. What this change amounts to and the best ways to bring each baker into contact with the latest knowledge about it will be described at the Atlantic City convention by an expert on getting results for his bakery out of merchandising effort. Bakers may recall that when the wheat

crisis occurred a year ago an Indianapolis baker flashed a full page advertisement upon the Indiana public. It told what this wheat crisis meant to America. This full page was reproduced in Baking Tech-

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samples of every kind of campaign that any baker has ever devised to tell the story of his baked products, and to commend them to the notice of the housewife in her home.

nology and was seized upon by other bakers in Harrisburg, Penn., and in Honolulu, Hawaii, not to mention hundreds of cities in between. The man who wrote that vital advertisement, which in advertising language, "struck twelve" is the same man who will have charge of the conference at Atlantic City. It will be at 2 o'clock Tuesday afternoon, September 23. There will be on exhibit at the same time

The baker who has any problem of making the public acquainted with his goods can receive new light upon it at this conference. It isn't a tight and selfish one. You know when Elmer Cline wrote that telling advertisement on the Wheat Crisis, there was a question at the American Institute as to whether the plan was to copyright it and keep it exclusively for the Taggart Baking Co., or broadcast it to the baking world, for the free use of all to whom it appealed as a story that should reach each baking neighborhood.

So a telephone call went in for Indianapolis and the answer of Elmer Cline came back, coupled with a message from Alex Taggart for whose company the work had been done. The message was that the story as written was meant for the free use of the industry, everywhere, so that it might better clarify the wheat situation to the people, everywhere.

In this self same spirit Mr. Cline comes to Atlantic City in September to take charge of the educational work for the industry in the matter of telling bread's story to the public. The Tuesday conference over which he will preside is not for the advertising man, or the advertising manager of each baking concern. It is for the owner of the bakery whose money spent in merchandising must either be thrown away, or else bring back to the bakery the full return on the investment.

From Worst to Best

The bakery owner is the man desired at the conference and if he wishes to bring his advertising man, that will be another matter, and the latter will be entirely welcome. There will be no set speeches to listen to. There will only be a free and full and frank discussion, to which every person present is expected to contribute and to take away ideas, and to ask questions and state problems as he sees them.

Here is a fine example of what the con-

ference may lead to. Mr. Cline was interested in the cracker industry, as the baking company he represents bakes crackers also. He made up an exhibit of cracker advertising—all kinds of cracker advertising, the very worst with the very best. One man was present, whose advertising was the very worst.

Mr. Cline showed him that color work was only good if it was good color work. He pointed out that in a series of window cards put out by this cracker man the crackers, colored, looked as if they had scarlet fever or measles. The man had spent money—on mechanical preparation—but had not been in touch with a competent artist to prepare the original sketches, nor with a competent color-print shop.

Result? While the staff of the American Institute was at work preparing layouts of the great advertising campaigns that have engaged the attention of individual bakers, a package arrived from a cracker baker. It was this same one, whose advertising two years ago was the very worst in the industry. Now the advertising had taken on new color, new quality, new appeal. **It was the best the industry could boast of.**

"The best loaf baked does not become of value to the baker," said the chairman of this coming conference, "until its merits are made known in the best possible way by those who are to consume it. Advertising is a **matter of knowledge**. It is a matter of gaining information.

"We know how it goes with a great painting. Men give their lives to the study of paintings. They slowly evolve a consciousness of what is good and bad. When one had seen all the great paintings of the world, he begins to settle upon an opinion that one or another is better than the rest. And so a painting like Mona Lisa emerges as one of the world's masterpieces.

"A man who had no knowledge of

painting might easily deceive himself into the idea that some mere daub was great, but when he came into possession of more knowledge, he would find why the authorities laughed at him at his first pretenses.

"It is just so with literature. Those best acquainted with the most literature finally mature the comparative judgments on which we are made acquainted with Poe's *Annabel Lee*, as a masterpiece, and with Tennyson's *Locksley Hall* as another in its own particular field.

"In the case of bread merchandising there is a best way to make a window display, a best way to dress a counter, a best kind of counter to have, a best kind of neighborhood campaign, a best kind of National campaign, a best kind of city-wide campaign.

Information Necessary

"There is a best way to do personal contact work, and many other ways in all these fields that are far from best. What we are doing at Atlantic City is to bring all the ways together, where any one baker can study them. If he sees fifteen different ways of reaching a neighborhood group he is much more likely to hit on the right one for his own neighborhood after he had studied all fifteen than before he has studied any."

The conference that Mr. Cline will conduct will be held under the auspices of the Committee on Publicity and Advertising of American Bakers Association. The exhibits that will accompany the Round Table discussion have been collected as a basis for starting a Trade Promotion Department in the American Institute of Baking. No selection will be made, for the purpose of giving exhibit space, of the good advertising from the bad advertising. By examining all, the students of the exhibit will be enabled, through comparative studies, to arrive at an idea of what is the best for himself.

The exhibition of advertising material will be in two groups. In the first group will be the advertising done by bakers themselves. In the second will be advertising done by allied interests which have tied their products in with bread and baked goods.

Sections of Exhibit

Often these advertisements have been written by men with years of experience in the bakery. Just so Conrad wrote his wonderful books of the sea because he lived forty years before trying one and in those forty years he accumulated a vast field of experience and knowledge about the sea, so that his books reek of the rigging and the wash of sea waves over low decks.

The Newspaper Series. Full page newspaper campaigns have been run by many bakers. These have been collected and will fill a number of the 200 display boards through which the wealth of accumulated advertising data of our industry will be displayed to bakers. The man who started the American Institute to collecting these advertisements, began himself years ago, by collecting a newspaper scrap book filled with effective advertising campaigns. He collected, first of all, a cigarette advertising series. When he had the series completed, he began to study it, and found that everyone of its 100 pieces of copy told the same story. This cigarette was the "joy" smoke and the advertisements told why the banker liked it, why the college boy liked it, why sister liked it, and why the soldier could not be without it.

Years later this same student of advertising wrote a campaign for a bakery.

In one full page advertisement, illustrated by a beautiful portrait of a mother, he told why mother liked his bakery's bread. In another, beautifully illustrated with the picture of a bride, he told why brides liked it. In other advertisements

he told why the grocer liked it, why the banker liked it, why the school teacher, the grandmother, the children, and the picnicker like it.

This series has been collected and may be studied, along with the slogan that tied all together: "A butter bread—a better bread."

Another baker developed a character "Eton B. Helthee," and all of Eton's "wise cracks" about baking will be on display.

One baker took up the idea of "hates" instead of "likes." But he made all of his hates into humorous ones, indulged in by likers of his own brand of bread. This series will be on display to give the baker a view of a humorous attack upon the reader's susceptibilities.

There will be on display series that work for the health appeal, that glorify the loaf as a whole for its appetising quality, that describe each ingredient on a get-acquainted basis. Besides the complete campaigns there will be examples of many types of episodic advertisements.

National Magazine Advertising. These have been attempted by some bakers, but they have been counted as mostly a loss because the advertisement went to hundreds of thousands of readers who could not get at the brand of bread being advertised. In such cases they often glorified the industry as a whole and were a gain to it, while a loss in direct sales to the advertiser. While national advertising is recommended only to people whose product sells on a nation-wide scale, the various campaigns that have been attempted will be on display in consecutive order.

Outdoor Advertising. Bill boards have been photographed for this exhibition in all parts of the United States. Dr. L. A. Rumsey of the American Institute made a tour of the west coast, just to study ad-

vertising methods in vogue and obtain material for the exhibition. Among the material sent in is much that has to do with bill board displays, either in the form of photographs or in original posters.

Store Advertising. Often the bakery is its own best advertisement, especially when people walk to it for their bread as they do in many of the smaller towns. Many types of store advertising have been developed. They will be set forth in a department of their own where those who wish to focus attention on their plants can do so.

Window Displays. These often are made up in a form as attractive as some others are unattractive. Windows will be dressed as samples of what is best in window dressing and the principles of window dressing will be fully gone into.

Direct Mail Advertising. Have you ever tried to reach your customers by direct mail advertising? Many bakers have and examples of their letters, circulars, broadsides, newspaper inserts, blotters, calendars, booklets, and souvenirs, will be on display. Perhaps among them you can find just the series that fits your needs. One baker took advantage of the Sunday supplement idea of pictures the children can color. He made up his bread product into attractive pictures and sent them to the city's children to be colored. The series was so effective that soon school teachers were asking for sets in wholesale lots to give to their tiny tots. It will be on display.

Co-operative Advertising. Sometimes bakers have specialized in advertising to glorify the foods for which bread is the carrier. Displays of such advertising will show to what extent it has been possible to carry it, with the baker paying the bill to advertise bread and show its allied foods.

The Bread and—Campaigns. As all bakers know many commercial groups

have glorified bread in selling their own product. They have taken a leaf from the preachment that John Burns, president of the Allied Trades, brought to the baking industry and have "advertised it as it is eaten." Of course the Fleischmann Company pioneered the way in co-operative advertising by advertising bread for years as a means of selling more yeast by getting more bread into consumption. The co-operative advertising done by this company will be featured at the exhibit.

The many advertisements of the Washburn-Crosby Co., that glorify bread will be shown along with those of the Pillsbury and other companies that have similarly reached over from flour to baked goods as the themes on which most effectively to sing.

The Sunmaid Raisin Co., conducted a campaign that cost \$2,000,000 and brought the message of bread with raisins in it to every cross roads in the country. Its striking advertisements and display cards will be on exhibit where all can study them.

The meat interests abandoned long ago the idea that meat by itself was the food it should be and could be if combined with bread and milk. Their series of Meat and Bread advertisements will be one of the exhibition's features.

No less than the meat men, the milk interests and the fruit preservers, as well as the cheese and buttermakers, have printed bread and milk, bread and jam, bread and honey, bread and cheese advertisements. There have been, even, many bread and oleomargarin advertisements. All these will be on display.

Thus is the nature of the major thrust for this year by the American Institute of Baking shaped up for the consideration of the industry. It was developed along the line laid down above because it was felt by the Board of Governors that

the industry was in good shape in the production department, that baking plants were in the main sanitary and of a kind to inspire confidence on the part of the public in the output, and that the channels had all been opened to bring new scientific data constantly to the industry's notice. There remained the task of centering knowledge about bread's story and the relations of the baker to the consumer, through his spoken, printed, pictured, and radioed contacts. It is to bring this field up to the other departments of baking activity that the advertising exhibition was devised. Some hope that out of the conferences Elmer Cline will preside over, may emerge a permanent organization of bakery sales and advertising managers. It will take its place, if formed, beside the Society of Bakery Engineers which is now consolidating production knowledge, and putting it in a form where it will be available to all.

From a Grocer

WE WHO are in the grocery business are delighted to note the way in which bakers are now offering window cards to grocers advertising not only their brands of bread, but all the things that go with bread, so that the grocer receives a service as well as rendering one when he gives the cards window space.

Our efforts to co-operate with the food-producing factors are sometimes met with indifference, but not by the baking industry. We are hoping to advance the work of the National Association of Retail Grocers until we reach the enviable place occupied by the American Institute of Baking in your industry. I believe bread merchandising merits the best thought and study that can be given to the subject both by grocers and bakers.

—H. C. Balsiger,

Secretary-Manager, National Association of
Retail Grocers.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

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AUGUST 15, 1924

We Work Together

***To win through quality production
and the utilization of scientific research
a welcome for two loaves of wheat
bread for every one that now finds favor.***

For Service-Compensation

AS expressed so well in Emerson's famous essay on Compensation, there are necessarily many privileges and benefits received by a president of American Bakers Association for the many sacrifices that are a part of the office. Among such compensations is the great satisfaction of doing something for the good of the world at large and the industry in particular without receiving therefore monetary consideration. Another of the blessings of the office, and almost the most important one, is the number of new friendships made and old friendships strengthened. We have had complete proof of the theory that friendship is the greatest thing in the world and we will long remember the many kind courtesies accorded us during the year.

But, among the many privileges, none can surpass the opportunity of inspecting the greatest asset of the industry. By such asset we do not mean any of the large bakery plants with their splendid equipment and wonderful scientific control. Neither do we refer to the American Institute of Baking which is so important a part of the

baking industry. We do not consider the vast amount of wealth invested in the baking industry nor are we thinking of the wonderful loaf of bread which is now being supplied to the American Housewife by the progressive bakers of this country.

Our thoughts are not directed along the lines of material things such as brick, mortar, steel, gold or dough. We have in mind the body of men who graduated from the American Institute of Baking a few days ago and to whom we had the pleasure and privilege of addressing a few remarks. These men and similar graduates of earlier classes have been trained not only in knowledge of the chemical reactions which occur in the production of a loaf of bread; not only in ability to examine intelligently the materials which enter into bakery products; not only in acquaintance with the most approved shop practices; but also what is far more important, in an appreciation of the ideal of service, in a recognition of the fact that the most important duty of the scientifically trained baker, as well as others, is to supply the American Housewife with a food which shall be at the same time wholesome, nutritious and economical. From such flesh, blood and brain a new baking industry is arising like a phoenix from the ashes of the old craft which has existed since the time that Lot "Made a feast and did bake unleavened bread."

RAYMOND K. STRITZINGER,
President.

Baker and Miller Inc.

EVERY year some spokesman at the National convention of the baking industry sounds a key-note that guides the destiny of the industry for some time to come. Some years ago it was Jay Burns with his clear-cut vision of the need for sanitation. Later it was Win Campbell with his view of how the baking industry ought to cooperate with Herbert Hoover

and the Food Administration to bring bread baking into full harmony with war needs. Alex Taggart started a new thrust, after the war, with his preachment in favor of founding an American Institute of Baking, as a rallying point for the industry, and last year Prof. E. V. McCollum gave us the key to eternal watchfulness over the nutritive quality of the baked loaf.

Each of these men, in their day, started controversies after the fashion of all who break new ground and blast established orthodoxies with new ideas. All are judged more favorably as time sheds new light on the stands they made for distinct movements of advance.

This year the honor of setting forth the commanding need of the industry falls to Hon. Sydney Anderson, new president of the Millers' National Federation. He is to tell us about Miller and Baker, Inc., the new firm that had grown up to act jointly in furthering the advance of wheaten foods, instead of acting as two rival groups jockeying with one another for advantage. It is easy to see ahead to junior partners who will want to join this firm. Bakers already realize that the restaurant man and the hotel chef can work evil or well for bread's status in the diet, and that the baker must invade the restaurant and hotel to teach the most advantageous use of baked foods, and align his baking with the best principles both groups can develop. The farmer, with more prosperity, shakes off his mood of lashing the baking industry, and he, too, will come to see that every loaf of baked wheat eaten starts another bit of wheat from his granary into town. He in due time will apply for a place in this public service firm.

International

WITH a student in our School of Baking scheduled from Japan and one on his way back to Honolulu after

graduating, the Institute is rapidly expanding its influence over the earth.

"Can you analyze some samples of flour for us and tell us of their baking value," writes Juan Bigas of Ponce, Puerto Rico. The answer was sent that we certainly could and would be glad to help in Puerto Rico as anywhere else to get the best baking value possible out of flour used.

From Theodore Kowalszik came a letter written in Ukrainian asking for data about our School of Baking. It was furnished at once and his inquiries suggest he may be a student in the near future.

A letter from Brazil tells us of baking troubles down there and it is coupled with a request that flour be analyzed as a basis for working out better bread formulas.

Similarly to South America sails a George Amidon, a graduate of the School of Baking, to teach the better use of flour from America in those hot countries.

Who Are Wanted

OBVIOUSLY those bakers are most wanted in the industry's future who most nearly give the public what it wants in the shape of bread. If the public tastes change, the baker most wanted is he who is alert enough to watch this change, know it, and cater to it before his trade has ebbed away.

It is apparent that the baker who is wanted must know that politics affects him, that the tariff affects him, that the credit situation affects him, that public opinion affects him. He must know that all these are part of his business. Therefore he can no longer be a man whose mind remains indoors, within the walls of his shop, or even within the confines of his town. The proof is that wherever this writer travels he finds the bakers who pay attention to the National causes that are affecting them, growing more and more in their power to serve their own neighborhood and their own friends, to increase their own standing.

Composition of Materials

A Survey of Malt Extracts and Syrups Received at the American Institute's Laboratories

By C. B. MORISON

MALT extracts and syrups are complex in composition and their complete analysis is a difficult analytical problem. They are produced commercially by a number of manufacturing processes, which are primarily based on the evaporation and concentration of the filtered wort from a mash of malted cereal grains. The resulting extract, syrup, or concentrate is sold to bakers, confectioners and other consumers under many trade names and claims. In recent years the number of brands of malt extracts and syrups has greatly increased due to conditions in the brewing industry which are too well known to require further comment here. The usual brewery equipment and rather simple additional apparatus such as filter presses and vacuum pans can be readily adapted to the manufacture of malt extract and syrups.

Some manufacturers of malt extracts and syrups claim that their products are made exclusively from barley malt. Others are made from mashes containing barley malt and other cereal grain products such as rice and corn. Some manufacturers have even advocated "hopped" malt extracts in baking, but such products are unsuitable for use because of their strong hop flavor which is objectionable to most consumers of bread.

The determination of the extent of additions of other cereal grain products in an extract claimed to be made entirely from barley malt is of considerable importance and the problem is a difficult one as is well recognized by chemists.

In some cases, malt extracts and syrups contain in addition to the normal amounts

of water soluble constituents extracted from the mash, considerable amounts of calcium and ammonium salts which are present chiefly as phosphates. Lactic acid is also added in some cases by the manufacturer. These and other similar additions can usually be detected by chemical analysis.

The possible addition of such carbohydrate materials as molasses and corn syrup as suggested by Jago in discussing adulterations of malt extracts is also of interest. However, we have not met with this condition in the samples of malt extract and syrups submitted to our laboratory for examination. It is probably somewhat uncommon at present.

There are no standard methods for the examination of malt extracts and syrups except those which are applied to carbohydrate products generally. The separation and determination, as well as the identification, of the sugars, dextrans and other carbohydrates found in malt extracts is extremely difficult. The chemist is obliged to apply a combination of direct and indirect methods, which involve mathematical calculations and the results secured at best are but approximations. There are no published complete analyses of malt extracts and syrups which are entirely satisfactory from the standpoint of the separation of all the carbohydrates.

A similar condition applies to the separation and determination of the complex nitrogen, and the phosphorus constituents. The determination of the diastatic power is generally done by the Lintner method, but the modifications of this method employed in different laboratories are vari-

ous, so that the direct comparison of results is not always satisfactory.

The determination of proteolytic activity is a problem of a high degree of complexity, and rapid and satisfactory methods are not yet available for control work.

There are also no specific definitions and standards for malt extracts and syrups adopted by food officials in connection with the pure food and drug laws.

In view of the inherent analytical difficulties and the amount of time required to make even an approximate complete analysis of malt extracts and syrups, it has become customary for control and analytical laboratories to confine the examination to those essential determinations which may be carried on rapidly and yet provide the necessary information as to the quality and suitability of the product for the purposes required by the baker.

At present all samples of malt extracts and syrups received at the Institute are subjected to the following routine examination.

1. Specific gravity at 20°/20° C. and in terms of Baumé.
2. Color—Lovibond Tintometer Scale.
3. Moisture and Total Solids.
4. Reducing Sugars as Maltose.
5. Protein (Nitrogen \times 6.25).
6. Ash.
7. Phosphorus pentoxide. (Phosphoric acid).
8. Diastatic Power, Lintner.

In addition to these determinations, the condition of the sample is noted, especially the odor and taste. In some cases, other determinations are made as required, such as specific rotatory power, identification and determination of sugars, dextrins, fermentable matter, etc. Baking tests are also made in connection with special requirements and claims which are necessary in order to provide information which can be obtained in no other way.

Table I presents analytical data obtained from the examination of sixty-two samples of malt extracts and syrups ex-

amined by the Analytical Laboratory of the Institute. Most of these samples were received under special identification marks and their brand or trade name is unknown.

Specific Gravity and Baumé°

The specific gravity of the samples in Table I ranged from a minimum of 1.378 to a maximum of 1.418. The average was 1.393. Expressed as degrees Baumé; minimum 39.8°, maximum 42.7°, average 40.9°.

Moisture and Total Solids

The moisture ranged from 19.34 to 25.49% and the total solids from 74.51 to 80.66%. The average moisture was 23.19% and the average total solids 76.81%. Leach (1) has published three analyses of malt extracts with an average total solids of 77.3%. Sykes and Mitchell (2) cited in Allen (3) state that the total solids range between 75 and 82%. A recent Swiss report (4) on malt extract gives an average of 77.3% solids.

Reducing Sugars as Maltose

The reducing sugars as maltose, ranged from 54.93 to 72.96%. The average was 65.11%. When calculated on the dry basis the reducing sugars range from 72.68 to 94.15%.

Less than 15% of the samples in Table I were below 60% in reducing sugars, the majority of them, slightly over 78% of the total, varied between 60 and 70%, while the remainder were over 70%. Malt extracts made in the Institute laboratory have yielded from 74.3 to 91.5% of reducing sugars on the dry basis.

The characteristic sugar of malt extracts and syrups is maltose. Other sugars are always present, chiefly dextrose or glucose, as has been shown by Ling and Rendle (5). These investigators have pointed out the normal presence of glucose in authentic malt extracts to the extent of 22%, and have indicated the import-

ance of the normal presence of this constituent in relation to possible adulterations of malt extracts with corn or glucose syrup. Cane sugar or sucrose is not normally found in malt extracts except in small quantities. The presence of levulose and invert sugar has been reported in some analyses. The actual maltose content is difficult to determine satisfactorily, since published figures are but approximations. Ling and Rendle found from 25.2 to 31.1% of apparent maltose, while Korn in 1896 stated the maltose content to range from 41.43 to 60.43%. Jago has reported malt extracts with a maltose content as high as 53.65%.

Protein

The nitrogeneous constituents of a malt extract are complex and the use of the term protein obtained by multiplying the total nitrogen by 6.25 is not exactly correct, because it includes all the nitrogen as protein. In Table I the total nitrogen has been calculated to protein as this seems to be in accordance with the usual practice of control laboratories.

The total protein ranged from a minimum of 1.96% to a maximum of 8.41%. The average was 5.58%.

When calculated to the dry basis the protein ranged from a minimum of 2.59 to a maximum of 11.04%, with an average of 7.26%. The importance of the protein determination will be discussed subsequently in connection with the ash and phosphoric acid.

Ash

The ash ranged from a minimum of 0.81 to a maximum of 2.02%. The average was 1.31%. When calculated to the dry basis the ash ranged from 1.02 to 2.65% with an average of 1.71%.

Phosphorus Pentoxide (P_2O_5)

The phosphorus pentoxide, (P_2O_5) was determined in the ash. It represents not only the inorganic phosphorus but also or-

ganic phosphorus. The separation of phosphorus compounds in a malt extract is difficult and it is customary to express the results as P_2O_5 . The phosphorus of malt extracts exists largely as phosphates.

This determination closely approximates the total phosphorus present.

The P_2O_5 ranged from a minimum of 0.29 to a maximum of 0.73%. Three samples contained the maximum of 0.73%. The average of all samples was 0.55%. When calculated to a dry basis the average P_2O_5 was 0.72%.

Color

The color was determined in the Lovibond Tintometer using the standard colored glass slides of this instrument for matching the color of the sample. Some of the samples showed very high readings. The maximum of 220 was extremely dark in color and is thus unsuitable for bread making. Two samples gave readings of 110 and 130 respectively, which are also undesirable. Readings above 50 are rather too high for general purposes.

Lintner or Diastatic Power

The Lintner value or diastatic power expressed in degrees Lintner shows considerable variation. The maximum was 66. There appears to be a tendency at present towards the use of extracts of low diastatic power as in indicated in Table I. Experiments of W. C. Luckow recently completed in the Institute laboratories on the influence of various storage conditions on the diastatic activity of malt extracts have shown that in general there is little loss of original diastatic power during storage over a considerable period of time. The final results of this investigation will be published in Baking Technology.

Adulterants

The detection of adulterants in malt extracts and syrups and the satisfactory identification of a product as made entirely from barley malt is a difficult prob-

TABLE I. ANALYSES OF MALT EXTRACTS.

Sample No.	Sp. Gr. 20°C./20°	Be ¹ .°	% Reducing %				% Ash	% P ₂ O ₅	Color Lovibond	Linters Value
			% Moisture	% Total Solids	Sugars as Maltose	Protein N X 6.25				
267	1.412	42.3	20.30	79.70	64.33	5.97	1.36	0.58	32.5	5
333	1.388	40.5	23.98	76.02	68.58	5.54	1.28	0.58	52.5	23
342	1.389	40.6	23.80	76.20	69.24	8.41	2.02	0.73	110	56
386	1.406	41.9	21.22	78.78	65.25	5.53	1.38	0.68	50	19
387	1.417	42.7	19.55	80.45	67.96	6.00	1.38	0.61	43.8	5
409	1.389	40.6	23.81	76.19	68.04	5.37	1.43	0.48	60.0	23
418	1.393	40.9	23.23	76.77	69.18	6.01	1.72	0.68	70.0	50
501	1.392	40.8	23.44	76.56	69.50	6.04	1.56	0.68	50	25
502	1.391	40.7	23.57	76.43	68.42	5.43	1.32	0.53	70	58
529	1.415	42.5	19.82	80.18	63.90	7.32	1.59	0.48	65	22
530	1.415	42.5	19.84	80.16	68.86	6.17	1.19	0.48	60	19
677	1.385	40.3	24.42	75.58	54.93	1.96	0.87	0.29	20	trace
687	1.385	40.3	24.54	75.46	66.23	6.10	1.47	0.68	55	32
739	1.410	42.2	20.56	79.44	65.50	7.50	1.56	0.73	220	0
760	1.387	40.5	24.24	75.76	67.27	6.66	1.38	0.68	47.5	16
800	1.389	40.6	23.89	76.11	63.54	3.50	1.13	0.39	27.5	8
806	1.384	40.2	24.58	75.42	60.06	4.69	1.34	0.48	30	9
811	1.401	41.5	21.94	78.06	63.10	5.50	1.14	0.44	75	2
814	1.400	41.4	22.08	77.92	63.06	5.40	1.13	0.48	67.5	1
879	1.409	42.1	20.80	79.20	62.02	6.30	1.47	0.68	60.0	12
916	1.391	40.7	23.45	76.55	59.09	4.29	1.05	0.44	35.0	6
1003	1.393	40.9	23.28	76.72	69.07	7.67	1.49	0.68	75	66
1004	1.383	40.2	24.82	75.18	63.17	5.73	1.30	0.53	35	62
1005	1.403	41.7	21.65	78.35	64.41	5.79	1.31	0.58	65	17
1072	1.389	40.6	23.91	76.09	61.71	4.36	1.10	0.44	35	8
1126	1.412	42.3	20.28	79.72	67.63	8.24	1.58	0.73	47.5	36
1261	1.391	40.7	23.47	76.53	66.01	5.50	1.31	0.48	37.5	7
1443	1.389	40.6	23.80	76.20	64.62	6.21	1.49	0.73	35.0	31
1493	1.386	40.4	24.24	75.76	63.62	5.26	1.28	0.48	40.0	5
1630	1.394	41.0	23.12	76.88	70.73	5.60	1.28	0.56	40.0	56
1631	1.392	40.8	23.30	76.70	65.73	3.97	1.08	0.40	37.5	6
1683	1.401	41.5	21.96	78.04	67.04	3.66	0.86	0.39	57.5	2
1684	1.384	40.2	24.53	75.47	67.01	6.05	1.31	0.53	35.0	37
1719	1.418	42.7	19.34	80.66	68.96	5.47	1.21	0.63	52.5	37
1720	1.381	40.0	25.09	74.91	62.60	4.79	1.05	0.48	35	6
1721	1.390	40.7	23.72	76.28	69.12	6.49	1.39	0.58	75	38
1722	1.396	41.1	22.73	77.27	66.07	5.43	1.13	0.58	35	8
1919	1.385	40.3	24.42	75.58	63.12	4.48	1.15	0.48	25	7
2055	1.385	40.3	24.41	75.59	63.43	4.52	1.26	0.50	25	6
2056	1.392	40.8	23.32	76.68	63.64	4.91	1.34	0.50	32.5	5
2111	1.386	40.4	24.26	75.74	59.89	5.28	1.17	0.50	30.0	2
2310	1.381	40.0	24.98	75.02	57.16	5.06	0.84	0.50	27.5	2
2560	1.378	39.8	25.49	74.51	57.48	4.42	1.16	0.50	25	1
2657	1.387	40.5	24.20	75.80	69.25	5.37	1.14	0.50	65.0	46
2658	1.381	40.0	24.98	75.02	59.48	4.99	1.31	0.55	67.5	3
2744	1.387	40.5	24.20	75.80	59.78	4.72	1.37	0.52	37.5	2
2987	1.388	40.5	24.05	75.95	59.18	6.22	1.32	0.58	60.0	0
3274	1.387	40.5	24.21	75.79	66.07	5.60	1.32	0.58	52.5	3
3340	1.382	40.1	24.93	75.07	57.93	5.30	1.32	0.52	47.5	2
3489	1.386	40.4	24.28	75.72	65.13	5.98	1.39	0.53	52.5	4
3514	1.387	40.5	24.12	75.88	69.87	6.28	1.63	0.65	47.5	55
3515	1.390	40.7	23.69	76.31	60.77	5.92	1.48	0.63	60	2
3516	1.398	41.3	22.51	77.49	72.96	6.31	1.38	0.58	40.0	58
3613	1.399	41.4	22.23	77.77	72.72	7.39	1.42	0.66	75	56
3744	1.391	40.7	23.48	76.52	66.20	6.21	1.41	0.58	60.0	3
3960	1.409	42.1	20.82	79.18	71.52	2.61	1.18	0.50	55	20
3975	1.412	42.3	20.37	79.63	71.08	2.65	0.81	0.30	62.5	21
4074	1.393	40.9	23.26	76.74	67.94	6.14	1.46	0.62	130	3
4385	1.392	40.8	23.29	76.71	64.72	6.72	1.41	0.45	80	0
4561	1.388	40.5	24.01	75.99	61.87	6.19	1.49	0.62	50	2
4602	1.379	39.9	25.34	74.66	68.19	6.65	1.44	0.63	45	59
4670	1.386	40.4	24.33	75.67	61.61	5.94	1.30	0.55	35	3
Average	1.393	40.9	23.19	76.81	65.11	5.58	1.31	0.55		

lem. It has been well expressed by Jago who states: "There is considerable difficulty in detecting with certainty adulterations of malt extracts, firstly because of great variations in composition resulting from different modes of treatment of the same malt, and secondly because malts themselves differ very considerably in composition, according to whether "green" or air dried, amber, or high kiln dried. Further, the usual adulterants consist of the same constituents obtained from other and cheaper sources."

There is little satisfactory information in the literature on this problem. Ling and Rendle as previously stated have indicated the presence of normal and high amounts of dextrose in malt extracts in connection with the detection of additions of corn syrups. Sykes and Mitchell as cited in Allen have stated that the total solids of malt extracts range between 75 and 82%, phosphoric acid (P_2O_5) between 0.5 and 1.15%, and total nitrogen between 0.4 and 2.25%. Tolman and Riley (6) in their study of a similar problem in connection with the identification of all malt beers, state that the use of rice, corn or corn products, and brewer's sugar as substitutes for malt reduces the content of protein, ash and phosphoric acid in the finished beer. They also state that the difference as regards the protein, ash, and phosphoric acid is a sufficient basis for distinguishing the all malt beers made in this country from those containing commercial mixtures of rice, corn, cereal and brewer's sugar. The low amounts of protein, ash and P_2O_5 shown by a number of the samples in Table I as compared to the general average of these constituents is striking. These amounts are also of interest when compared with the following analyses of malt extracts made from pure barley malt by A. W. Landstrom in the Institute Laboratory. A, was an extract made from a

Manchurian barley malt and B, an extract made from a western state malt.

TABLE II
Analyses of Barley Malt Extracts

	A%	B%	
Total Solids.....	81.42	83.13	Original
Reducing Sugars as Maltose.....	91.54	80.97	dry basis
Protein—N x 6.25.....	9.38	5.19	" "
Ash	1.84	1.79	" "
P_2O_5	1.01	0.93	" "
Color—Lovibond	37.5	37.5	
Lintner Diastatic Power... ..	53	12	

Extracts A and B agree fairly well in ash and P_2O_5 but the difference in the protein of over 4% is high. The original protein in the malt of A, was 12.83% and that of B, was 8.32%. The latter figure is low for western malts as they generally contain over 12% protein. The difference in the protein however in the extracts is of interest in showing the possible wide variation in the protein content of a malt extract prepared from a pure barley malt and the difficulty of fixing arbitrary limits for this constituent.

Extracts were also prepared in the laboratory from these barley malts containing 10, 20 and 30% of powdered corn flakes in one series of experiments; and 10, 20 and 30% of rice in a second. Such additions were followed by significant reductions in the amount of protein, ash and P_2O_5 ; but the results obtained did not warrant the fixing of arbitrary limits for determining the extent of additions of these products. It appears evident, however, that low protein, ash and P_2O_5 point to the probability that an extract or syrup claimed to be made entirely from barley malt contains other cereal products.

The acidity of malt extracts and syrups is of much importance in baking. This is generally determined by titration with standard alkali and the results expressed in terms of lactic acid or in cc. of standard alkali. We have found as high as 2.40% acidity expressed as lactic acid in some of the extracts examined. This sub-

ject requires considerable study especially in relation to a suitable method for the determination, and expression of the results.

The composition of malt extract or syrup suitable for baking purposes depends largely upon the use for which it is intended, especially in relation to the diastatic or proteolytic activity. In general a malt extract should be free from unpleasant taste, odor, and active fermentation. The specific gravity and Baumé reading should be about 1.39 and 40.7° respectively. The color should be less than 50 on the Lovibond scale. The moisture and solids should be not less than 24% and the solids not less than 76%. The total reducing sugars as maltose, which is an index of the fermentable matter of an extract, should range from at least 60 to 65%. The total protein not less than 5.00%, ash, 1.25% and the P_2O_5 , 0.50%.

In regard to the diastatic power the tendency at present is toward a low Lintner value, but this does not suggest that a higher Lintner value is not better adapted to certain types of flour; for this reason, it is obvious that specific suggestions in regard to degree of diastatic activity can only be made in relation to specific requirements.

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On Whole Wheat

I AM teaching the value of whole wheat bread by precept as well as by example, and I inclose you a letter telling of the experience of one convert. Wherever I get a convert where there are children in the family I feel that I have done a great service for the children of that family. Some day the human family will learn that it is bad manners, bad economy, and bad hygiene to tamper with the most important element in our food in the expectation that the harm done can be recouped in some way or other so as to eliminate the danger it has occasioned. Every wrong we do our cereal foods is reflected in some form or other in the poor health of our people.

—Harvey W. Wiley.

The letter inclosed by Dr. Wiley is from a woman. It reads: "During the year of the coal famine of the World War, our family found shelter in the home of a lady living at Mulhall Station just outside of Washington. As we huddled about our one fire in the kitchen, she told us many a tale of her adventures, not the least of which was how she had learned to eat whole wheat bread while residing with your family, and how you fed it to your children. I began experimenting with it and finally adopted it as the regular family ration."

Dr. Wiley was assured that no one in the baking industry resents his work as a converter and that the baking industry is today offering the public whole wheat bread to the full limit of public acceptance, but that this acceptance has never been found to be large or consecutive. The people, he was assured, seem to want the skin taken off their wheat berry the same as they do the skin off their bananas, their pears, their peaches, potatoes, oats, eggs, and corn,—and in fact almost every food eaten.

Bread Cooling on the Rack

Summer Problems Which It Presents to the Baker

By I. A. BERG

Research Department, American Institute of Baking

THE cooling of bread for wrapping during the summer months is usually a troublesome problem. In many cases it is necessary to revise the shop schedule in order to allow more time for cooling. One of the causes of mould and also rope during the hot months can be often traced to insufficient cooling. When a warm loaf of bread which is giving off moisture is wrapped, excellent conditions are created for the growth of these pests. Proper cooling of bread is, therefore, a condition which will greatly reduce the possibilities of trouble from mould and rope, but in addition precautions must also be taken to exclude them from the shop by the usual methods which may be summed up in the word **cleanliness**.

The loading and placing of a rack of bread to cool is usually done without definite system. The bread cools by giving up heat to the surrounding air **which should circulate freely** to have the greatest desirable effect. It is better to have a natural circulation than a forced one, since the latter causes checking of the crust and greatly increases evaporation of moisture from the loaf during cooling. The separation of the loaves on the trays and the racks from one and another will greatly facilitate natural and rapid circulation of the air.

It has been found in a study of bread cooling that the way in which a rack is loaded is also of much importance. A rack of bread having ten trays, each of which contained 35 one-pound loaves was carefully observed during loading and cooling under the conditions of commercial shop practice. The men taking the

bread from a traveling oven began loading the rack from the bottom up. As soon as each tray was filled the temperature of the interior of the loaf centrally located on the tray was taken and the time of observation noted. Conditions of temperature and humidity surrounding the rack were observed by hanging a hygrometer at the bottom, center and top of the rack every fifteen minutes from the time of loading until two hours later. When the rack was completely loaded it was placed adjacent to another loaded rack. After one and two hours of cooling had elapsed the temperature of the loaves first observed was taken again. The accompanying graph shows the way in which the centrally located loaf cooled off on each tray also the average humidity and temperature conditions surrounding the whole rack for a period of two hours. It is seen from the one and two hours curves that the bread placed in the bottom and upper trays cooled more rapidly.

These observations seem to show that in order to increase the rate and more uniform cooling of bread on a rack the **loading should begin at the top and continue downward to the bottom**.

It has been stated that bread should not be wrapped with an interior temperature above 95° F. In view of these observations it would seem desirable as a matter of precaution that the temperature of the loaf located in the center of the middle tray of the rack be taken with a thermometer before wrapping, especially during the summer months. It is rather obvious that a thermometer can be used to considerable advantage in other

parts of the shop and there are other uses for this instrument besides mixers, dough batches and ovens.

The above data was secured in connection with an intensive study of bread cooling in a commercial shop which has been the subject of considerable recent investigation by the writer. The results of the bread cooling studies will be published in later issues of Baking Technology.

Bakery Engineers

I HAVE read with interest the story in Baking Technology about the organization of the Society of Bakery Engineers. The idea you bring out is that they are in favor of throwing all known data "into the common pot," from which each member may draw that which he needs.

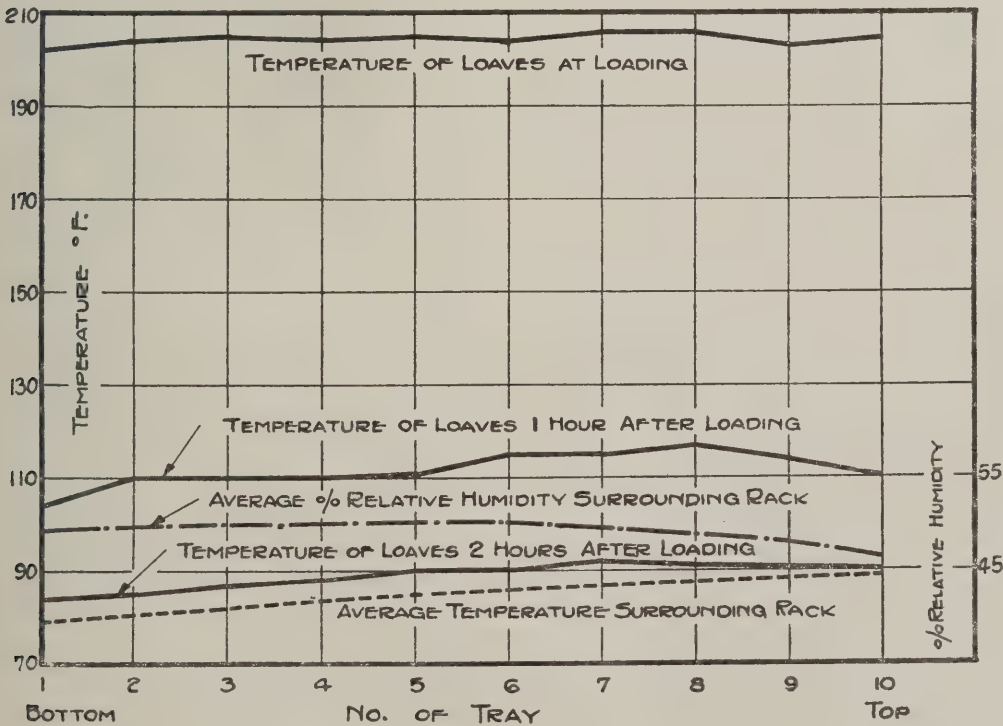
This is a supremely good idea and it should certainly bear fruit.

For over twenty years the writer has been doing his bit in regard to disseminating information helpful to the Trade, and it has been sometimes a very thankless job. The average good tradesman here considers that what he knows about the trade is just as equally well known to his confreres and he is shy about spreading it for fear of ridicule. Therefore the benefit of so much useful and valuable information is lost to others in the trade not so well informed.

—T. U. Ross, Christchurch, New Zealand.

The work of the American Institute of Baking appeals to me as a worthy effort to improve the plane of baking. It is certainly worth all the support the trade can give it.

C. H. Shrader, Director, Health Department, Baltimore, Md.



The Hope of Our Industry

*It is Found to Lie in the Scientifically Trained
Young Men Now Entering It*

By RAYMOND K. STRITZINGER*

DOESN'T every practical baker remember "away back when" men came out of a few chemical laboratories and were "book bakers?" For lack of practical acquaintanceship with shop conditions they "mussed things" when entrusted with shop work, and received only a scant welcome after a little experience with them.

All this came to an end when the American Institute of Baking established its School of Baking and one of Chicago's biggest bakers gave hundreds of hours of his time to so shaping the course, as designed by school men, that it would lead the student directly into shop conditions and the shop regime of a modern plant.

"Book baking" was cast out in favor of shop work, and practical demonstrations of every point made. In seven classes since its opening, the school has now turned out 167 graduate bakers who are equally at home on the bench or in the baking laboratory.

The latest of these classes, consisting of 33 students, graduated on August 13. The school whence they departed was by now on a self sustaining basis, whereas many bakers had feared it would swamp the National association's meagre budget; it was filled to capacity, whereas many bakers feared it was started years ahead of its time; it was practicable and practical, so that it brought out the praise of the most seasoned of bakery bench workers.

To these young men departing for bench and laboratory work President

Stritzinger addressed the following words of appraisal of the Industry in its present stage of development, and of their relationship to it.

IT is fifteen years since I received a diploma from a school of baking technology and I am deeply impressed with the changes in our industry since that time. And yet, fifteen years is a mighty short time, when we consider that centuries have passed since the establishment of the first school having to do with the baking industry. The emperor Trajan incorporated about 100 A. D., according to historians, a college of Pistoires or millers and bakers. Since that time there has doubtless been a constant effort to train new generations of bakers, whether through apprenticeships, trade schools, laboratories or other methods.

Hand-craft Methods

Most of the former baking schools, however, merely endeavored to teach the manual processes necessary in the production of a loaf of bread. We find a bas-relief on the tomb of a master baker of those early days, named Eurysaces on which the work of a bakery is vividly shown. Here the grain is being bought and paid for; mill driven by horse and ass power are busy; men are sieving out the bran from the flour by hand; bakers are moulding loaves on a board, an oven of dome-like shape is being charged by means of a peel; and baskets of bread are being weighed on the one hand and carried off on men's backs on the other.

It is not so long ago that such trade

*In an address to graduates of the School of Baking of the American Institute of Baking.

schools were the only place of training; were the only alternative to the apprentice system. Men were taught to do certain things with no knowledge of the reasons why they were doing them. It reminds me of the story that is told of an efficiency engineer working on the personnel problems of a railroad, who saw the name of one man on the pay roll who had been with the road for thirty years, had never missed a day's work and had never had an increase in pay. The engineer asked to see him. He came in and proved to be a colored man. The engineer said: "You have been with the road thirty years?"

"Yes, sah."

"Never missed a day?"

"No, sah."

"Never had an increase in pay?"

"No, sah."

"Just what work do you do?"

"Well, it is just like this. When the train pulls into the station, I gets a long hammer, crawls under the car and knocks on the wheels."

"What do you do that for?"

"Just why do I do that?" the darky paused and scratched his head. "Well, sah," he said finally, "I really just don't know why."

The Technical Stage

The next stage in the history of baking education was of course, that of the purely technical schools. In this case, students were crammed full of highly technical knowledge of the facts then known concerning fermentation and the factors affecting it. There was no endeavor to hook with such technical knowledge a practical experience with which to translate superficial knowledge into action. Such a condition undoubtedly served as a real hindrance in the progress of baking education. I can well remember that time when men left such insti-

tutions calling themselves chemists and gaining the ill will of the entire industry. It was not unusual for an applicant for a position to be shown the door in those days if he intimated that he had a diploma from such a school. The employer would say sneeringly: "Oh, you are one of those book bakers."

But, the world moves. There has been splendid progress in the baking industry. You will remember that our industry is one of the oldest in point of service to mankind. Bread baking is one of the most ancient of human arts. At Wangen and Robenhausen have been found the calcined remains of cakes made from coarsely-ground grain in Swiss lake-dwellings that date back to the Stone Age. The cakes were made of different kinds of grain, barley and one-grained wheat being among the ingredients. This bread was made, not from fine meal, but from grain crushed between some hard surfaces, and in these lake-dwellings many round-shaped stones have been found, which were evidently used for pounding or crushing grain against the surface, more or less concave, of other stones.

Pliny tells of a process by which wheat was pounded, and the crushed remnant, soaked into a sort of pulp, was made into a sort of cake and dried in the sun. Virgil refers to the husbandman first scarifying and then crushing his grain between stones. With this evidence, we are not surprised to turn to the eighteenth chapter of Genesis and find that when Abraham entertained an angel unawares, he bade his wife, Sarah, "make ready quickly three measures of fine meal, knead it, and make cakes upon the hearth." We are startled however, in the light of present day sanitation to take down a volume of the Travels of Herodotus and, turning to his visit to Egypt, find that he speaks of the Egyptians as

having carried the art of baking to high perfection. That historian then remarks, "dough they knead with their feet, but clay with their hands." As civilization advanced, however, it is not surprising that the manufacture of bread became a profession and the first step toward taking mother out of the kitchen was when public bakeries were established in Rome after the war with Perseus which ended in 168 B. C. It would then appear that the family which still maintains the practice of home-baking is twenty-one hundred years behind the times.

The Modern Way

With the advance in bread and its methods of production from the kind just described to the splendid, wholesome, nutritious whole-milk loaf of today as turned out in the wonderful sanitary, automatic plants of this day, it must be expected that there has been a similar development of the personnel of the industry. And, if the personnel has advanced, there must necessarily have been an advance in the method of training those who are to come after. As a result we have the American Institute of Baking. In the curriculum here, we have endeavored to combine the practical with the scientific. And, I believe that we have succeeded to the point where employers no longer scoff at such training but send employees to the institute or vie with each other in obtaining for their organizations men who hold diplomas. But, I say to you that the American Institute is a flat failure if it has not done more than this. No man should leave eleven hundred and thirty-five Fullerton Avenue with a sheepskin in his hand unless he has had developed within his breast a real ideal of the responsibilities and duties which are his by reason of his trainings. I do not refer to that very laudable regard for the institution as an Alma Mater and the

natural desire to see her grow and prosper. What I do want to impress upon your minds is the fact that you are going out into the world as part of that section of our industrial life that is supplying the American family with its daily bread and therefore have a duty to see that such bread is prepared in the safest, cleanest and most economical manner possible and that it contains all the elements of nutrition that it is possible to incorporate in a dough batch. Further, you have the grave responsibility of a "square deal" to every one, employer, employees and consuming public.

The great exponent of the square deal, Theodore Roosevelt, once said: "Don't flinch, don't foul but hit the line hard." And, looking at you men on this hot August afternoon, I am inclined to view your entry or re-entry into the baking world as the start of a game in which we must all play our part. Whether we are guard, tackle or fullback, our responsibilities are identical in many instances.

The Baker's Aims

Our first responsibility is naturally the earning of a livelihood for ourselves and our families. That being acknowledged, let us look farther. Nicholas Murray Butler once said that the first evidence of an education was the power of growth. Your training here has been absolutely wasted if you are leaving here with the belief that you have a complete knowledge of the game. It will be necessary for you to keep in touch with all of the developments in the industry through a careful reading of Baking Technology and the trade press. Only constant study and practice can round out the nucleus represented by your grounding in fundamentals.

"Bill" Tilden would not be the tennis champion of the world if he had been content to know the fundamental shots

of the game. Willie Hoppe had an early knowledge of the billard table but he followed it up with such careful and conscientious study that he is the champion of them all. Jess Sweetser, Max Marston, Chick Evans and the rest of their class did not become golf experts by merely knowing the shots. They played the game steadily but their real development was the result of many weary hours of study and practice of the individual shots of the game. Julius Fleischmann did not become a noted polo player simply because he was able to stick on a horse. He practiced. Just so, every one of you must expect that the top of the heap is only for the man with the tenacity of purpose that will keep him always eager for information without the attitude that he knows it all.

Calling Out the Team

Another characteristic of American sportsmanship is "teamwork" and a love of the game which compels the helping of the other fellow. Every follower of any sport is anxious to help the beginner, the substitute on the team whose time has not yet come, for he knows that the game cannot develop unless the men in it develop. Likewise he knows that the success of the team depends on the manner in which every player helps his colleagues. Just so, it is incumbent on every man of you to avail yourself of the privilege of membership in the American Society of Bakery Engineers for which your diploma makes you eligible. Attend their meetings and frankly tell of methods or processes which have been of assistance to you in your work. The real joy which comes from giving and from helping will more than repay you and you will receive the additional compensation of the benefit of the other fellows experience.

But the outstanding feature of any Anglo-Saxon sportsman is "fairplay."

Some twenty-five years ago, John Ruskin coined a word which should form as important a part of our vocabulary as "fairplay." I mean "Fairwork." Can you imagine how long Jack Dempsey would wear the belt of Champion Heavy Weight Boxer of the world if he were detected hitting foul? And yet, we are accustomed often to think of prize-fighting as a vulgar, low-brow occupation. May we as gentlemen be expected to conduct ourselves in our various vocations in a less upright manner than the boxer in the ring? Yes, some bouts are won and some business advantages are gained by the little tricks, but no one ever achieved lasting success in that manner. It is unnecessary for me to go into a long definition of "fairwork" in all this heat. Unless one is a hardened offender that little voice known as conscience tells us when we are unfair. But I assure you that dollars can never buy the satisfaction of standing before the mirror in the morning while shaving and looking oneself in the eye with the sincere and sure knowledge that we are playing fair and working fair no matter what the other fellow does. In the words of William Cullen Bryant:

"So live, that when thy summons comes
to join

The innumerable caravan, which moves
To that mysterious realm, where each shall
take

His chamber in the silent halls of death,
Thou go not, like the quarry-slave at
night,

Scourged to his dungeon, but, sustained
and soothed

By an unfaltering trust, approach thy
grave,

Like one who wraps the drapery of his
couch

About him, and lies down to pleasant
dreams."

Towards a Complete Food

The Role of Rice, Cabbage and Butter in the Diet

By ROSCOE H. SHAW

Department of Nutrition, American Institute of Baking

IN OUR first paper we discussed the nutritional value of the three common articles of food,—potatoes, apples and spinach,—in comparison with water bread and whole milk bread. We showed by a feeding test with white rats that while bread is not a complete food, potatoes, apples and spinach are even less so, and that whole milk bread is far superior to any of them in this respect.

Our present paper deals with a similar study of three more of our very common single articles of food: rice, cabbage and butter.

As stated in the first paper, it is not our purpose to bring out anything particularly new. The nutritional value of the three articles of food is well known. In butter we have a fatty food, where the fat is in a more highly digestible form than in any other food known to man. It also is an unequaled source of one of the vitamins. Another valuable single food is rice, a starchy food, which occupies the unique position of holding chief place in the diet of perhaps more human beings than any other food. Cabbage is also of great value as a food; it contains all of the known vitamins and is a valuable source of the necessary mineral salts besides being highly prized by dieticians because of its high crude fibre content.

The fact is well known but not thoroughly appreciated that few indeed of our single articles of food are in themselves complete. Individually, they will not promote growth or support life, but eaten in conjunction with certain other foods, the proper balance is secured and the requirements of the body are satisfied.

The fact reported a year or so ago that rats would not live on water bread formed the basis for a bitter attack on the nutritional value of bread as a whole. This attack was an unjust one. It took no cognizance of the fact that water bread is fast disappearing from the American market, being rapidly superceded by bread in which milk is playing an increasingly important part. Even a small proportion of milk in the loaf makes a remarkable difference in the growth and longevity of rats fed upon it. The attack also ignored the fact that bread is rarely eaten unaccompanied by other foods. It has, however, done some harm to the baking industry, and in many cases it left the baker bewildered as to a defensive procedure.

So the purpose of the feeding test we are here reporting is to show the baker how, from the nutritional standpoint, his bread compares with other common articles of food, and to place in his hands a defensive weapon, should he have occasion for its use. It is also to show him that by using whole milk as the only liquid ingredient in his bread he may place his product among those foods that, when eaten alone, most nearly meet our digestive requirements.

Exit of Water Bread

Nothing in this paper should be considered as reflecting on any single article of food. No one will consume a pound of butter and call it a meal. The Orientals long ago learned by bitter experience that they cannot live on rice alone.

As brought out in the former paper, the feeding test was conducted in the

usual way. Young rats were selected in their vigorous growing period. Their sole food during the test consisted of the single article of food being studied. Of this they received all they wanted; some of it was always before them. In addition to this, plenty of clean drinking water, as supplied to the city of Chicago, was constantly available to them. The rats were kept in individual cages under close observation. At frequent intervals they were weighed and from the weights thus obtained the growth curves in the accompanying chart were plotted.

The Butter Test

The butter used was the best quality of creamery butter purchased at a nearby market. The cabbage was sliced and fed raw. The rice was purchased as the unpolished variety and was also fed in the uncooked state.

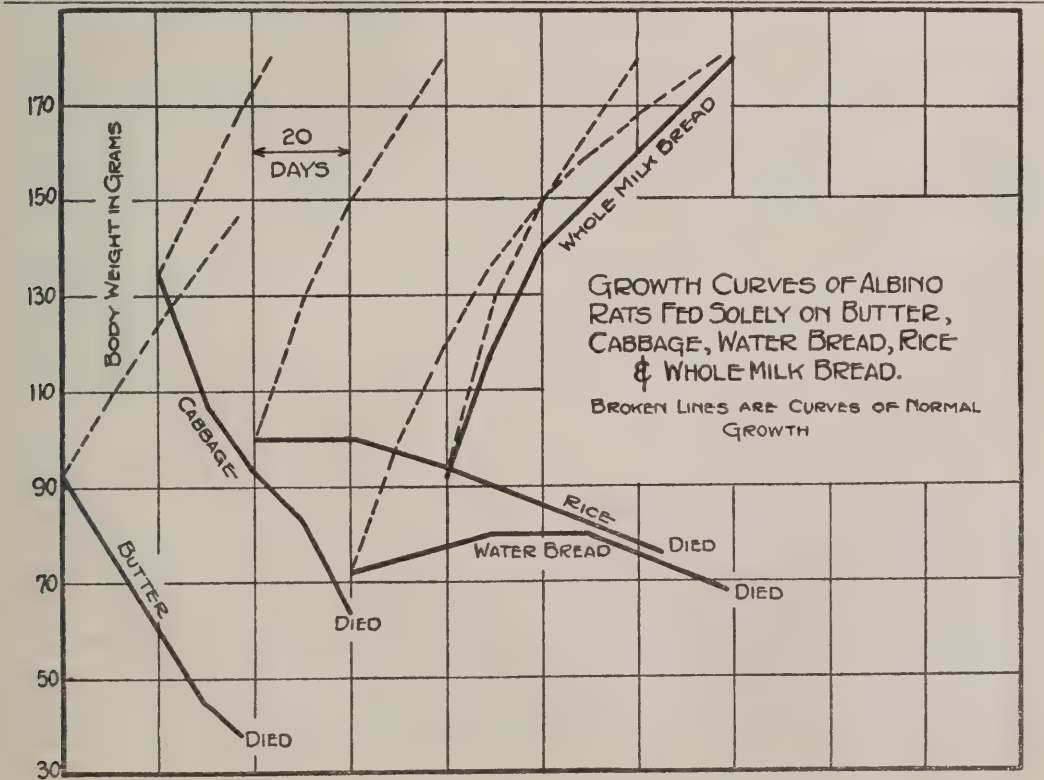
The bread used was made in the bake shop of the Institute from standard form-

ulas. The water bread, of course, contained water as its sole liquid ingredient. The whole milk bread contained sufficient powdered whole milk to make it equivalent to bread made with whole milk as the sole liquid ingredient. The bread was air dried, ground in a mill and presented to the rats in this form.

The chart requires little explanation. Each heavy line or growth curve indicates the growth of a representative rat in each group. The broken line or curve of normal growth shows how he would have grown had he received a food adequate in all essentials.

When placed under test the rat receiving rice weighed 100 grams. Although unable to gain, he held his weight for about three weeks, then a gradual decline ensued until his death on the 85th day when he weighed 76 grams.

The rat receiving cabbage weighed 135 grams at the beginning. His growth



curve declines much more sharply than does that of the rice rat. This rat lived on his diet 40 days and at death weighed 64 grams.

A still sharper decline will be noted in the growth curve of the butter rat. He started with a weight of 92 grams, but at the close, which occurred in 37 days, he had dropped to 38 grams.

Seventy-two grams was the initial weight of the rat receiving milk-free bread. He was able to increase this quite perceptibly for about one month and then to hold it for another month, after which his weight declined rather gradually until, at the end in 79 days, he weighed only 68 grams.

Quite a different story is told by the growth curve of the rat receiving whole milk bread. The gain here is consistent and the growth curve very nearly parallels the curve of normal growth.

As with the three articles of food discussed in the former paper, here again may we conclude that while water bread is not a complete food, some of the richest foods in the whole list fall into the same category. And here again we may call attention to the wonderful improvement in the nutritional value of bread brought about when whole milk becomes the sole liquid ingredient.

The next issue of Baking Technology will contain a continuation of this paper, showing the nutritive value of some others of the common articles of food as compared with bread.

Types of Raisin Bread

DURING the last month of the baking course at the American Institute's School of Baking, the students have charge of the shop. They, each in his turn, make out their formulas for any kind of bread or baked article desired and have charge of the shop operation on that day.

Naturally enough, many arguments arise as to the ingredients used and the best methods of handling the dough.

During this period there is always considerable discussion of the whys and hows and especially the how manys, of raisin bread.

In common with bakers generally, many of these students have not noted that there is a Government standard for raisin bread, while others know of its existence but not of its specifications. It reads as follows: "Raisin Bread is the bread obtained by baking Wheat Bread Dough, to which have been added sound raisins in quantity equivalent to at least three (3) ounces for each pound of the baked product and which may contain proportions of sweetening and shortening greater than those commonly used in Wheat Bread Doughs."

While the percentage of raisins is thus but 18.75 per cent of the baked product, it is twice that high when figured on the raw material. To explain—in the school when making our formulas it is found most convenient to call the flour 100 per cent. Then water will be 60 per cent, sugar 2 per cent and so on, depending upon the type of product desired and the ingredients available. On this basis, then, the percentage of raisins should be 35-40 in order to give us this 3 ounces per baked pound, or, in order that our bread may legally be called raisin bread we must add 35-40 pounds of raisins to every 100 pounds of flour.

What influences the baker in deciding the amount of raisins to put in his dough? His profit, naturally enough. This profit is determined by various factors, among which is the raisin cost, the higher price possible for raisin bread and the desires and expectations of the customers. The first was a very important consideration three or four years ago, but is much less so now when raisins cost about one-third

as much as they did at that time. As to the second influence, we have heard of a few cases where bakers claimed to have difficulty getting a higher price, but the chances are that this was in an exceptional community or that the bread offered was not worth more than the white bread. Reports and talks with bakers lead us to conclude that people are willing to pay three or four cents additional for a pound loaf of quality raisin bread. Some bakers, however, seem to have the idea that one or two raisins per slice of bread entitles them to this higher return. If they were buying such a loaf instead of selling it, would they be willing to pay the price asked?

The number of raisins present forms one of the chief elements in the consumer's idea of the loaf, while the others are concerned with the loaf itself, its appearance and eating qualities. In respect to the latter, the buyer is entitled to his money's worth there just as he is in the case of white bread. In regard to the appearance, there is the argument of raisins versus a large loaf. It stands to reason that if we add solid material such as raisins to a dough that is puffed up by gas during the fermentation and baking, there will be less volume. This is due to the solid raisins present and also to the fact that there is less of what we might call "flour dough" than in a white dough of the same weight.

Here again there may be a few cases where the public absolutely demands a large loaf as well as one well filled with raisins. One baker, for instance, makes enough on raisin bread to enable him to scale his raisin doughs at 21 ounces instead of 18 ounces for a one-pound loaf. That is his way of getting a larger loaf. Another baker uses a scaling weight of $17\frac{3}{4}$ ounces in the belief that the bread eater is not going to worry about the size of the loaf if it contains plenty of raisins.

That seems logical, and is borne out by his sales increase, as well as by the success of numerous other bakers.

In other words, the successful plan is that of charging more for a quality loaf with plenty of raisins rather than that of using few raisins in order to lower the cost of production. As the *Western Baker* for July states, "One experimenting baker found that by using 95-100 pounds of raisins to the barrel of flour, he could sell ten times as many loaves of raisin bread as he could by using 50 pounds to the barrel of flour." This same magazine has some interesting figures which show that 15,000 of the 22,000 retail counter bakers are featuring raisin bread as a Wednesday special, while more than 2,000 wholesalers are baking raisin bread regularly every Wednesday.

—C. F. Rudmann.

Growth and Change

IF the people of the country as a whole knew about the enormous growth in the baking industry within the past decade, and the huge sums of money now spent to produce a scientifically protected loaf of bread, they would be immune from most of the attacks made upon this most important industry.

The writer well recalls when milk was 9 cents a quart. That was only 15 years ago in New York City. But the milk was from dirty barns, in which cows were milked by dirty milk men, and the milk was shipped in indifferently washed cans, to be transferred in New York City into indifferently washed milk bottles. Also the milk was more often half-sour than wholly sweet. And its bacterial count would stagger the imagination.

All that has been changed in favor of milk on the protection of which much more money than formerly is now spent, and just so it is with quality bread.

Making Bread for Men at War

*Uncle Sam Now Organizing Field Bakery Companies for Reserve Corps
With First Company at American Institute*

By WASHINGTON PLATT

Captain, C. W. O. R. C. Formerly Commanding Officer, Bakery Co. No. 11

What baker knows when he will be taken from his bakery, given a bunk in a field baking company, and told to bake bread for 30,000 fighting men? William Walmsley of the American Institute of Baking, had that task assigned to him, with 101 bakers under his command, in France during the World War. How he produced his 30,000 pounds of bread a day, with men falling ill at every sick call, makes one of the richer romances of baking. This Institute has now been honored by a call to have its personnel enlist as Field Bakery Reserve Company No. 1. What a baker who works in war time has to encounter is here told by Captain Washington Platt, who will organize another of these reserve baking companies to be prepared for whatever emergencies may arise.

I WAS commissioned a Captain in the Reserve Corps in May, 1917. Soon thereafter, I was called to active duty and assigned to a Bakery Co., probably on account of my previous five years' experience in the factories of the National Biscuit Co.

One of the first things that I discovered was that "you can't play bridge with poker rules," or, put it in another form, "In Rome, we must do as the Romans do." In other words, the Army is the Army, whether it is an infantry company or a bakery company. A bakery company must live with other troops. The men must know how to live under field conditions, and must be able to march, entrain, detrain, pitch tents, etc. For this purpose, strict military discipline and the elements of close order drill are necessary. In fact, a knowledge of baking is far from sufficient without a knowledge of military methods in addition.

The Manager of a civilian bakery is responsible for the bakers during their working hours only. The Commanding Officer of a bakery company, however, is responsible for every detail of the lives of his men throughout the whole twenty-four hours. Their food, their clothes, their shelter and their behavior are entirely in his hands. The Commanding Officer must be his own Mess Officer and Supply Officer. If he looks out for his men, they are well fed, well clothed, and as dry and warm as circumstances will permit. If he is a good disciplinarian, the living quarters are kept neat and clean and the men are kept out of trouble. If the reverse, the tents soon become untidy and the men continually get into trouble with the Military Police. These strictly military duties consume at least as much of the officer's time as those directly connected with the baking of bread.

Bakery Company No. 11, which I had the honor to command, was quartered in

tents all through the winter of 1917-18. The mixing, fermentation, etc., of the dough was done in tents and bread was baked in the field ovens all winter. That winter was one of the coldest on record with much snow, the temperature going as low as zero.

Under these conditions, extraordinary care had to be taken to keep the tents warm. The bottom of each tent was weighted with wood and banked with earth to keep out the icy wind. Every tent was provided with the small conical army Sibley stove in which a vigorous wood fire was kept burning night and day. On very cold nights, the dough troughs were placed all together near the center of the tent and bread pans full of live wood coals from the oven fires were brought in and placed around them towards the walls of the tents.

In spite of all these precautions, parts of the dough would get cold during the fermentation period. This was overcome by adopting the sponge system. Hot water was added to the sponge when the dough was mixed. This gave a second opportunity to warm up the dough near the end of its fermentation, and to prevent cold spots in it. Expedients of this kind are fortunately not necessary in civilian bakeries.

Each non-commissioned officer in order to qualify for promotion, had to conduct successfully a "field baking test." To do this, one complete bakery unit, including oven, and all equipment, had to be taken down, packed on an escort wagon and hauled to another location. Here it was set up and several batches of bread baked. When the baking was finished, the equipment was again taken down, packed on the wagon and hauled back to its original position. All of this had to be completed within twenty-four hours.

These tests were carried out rain or shine, in hail or snow, whatever the

weather happened to be. A man who could carry one out successfully in bad weather could certainly claim to know his business and to be amply entitled to promotion.

They were an excellent test of a man's technical knowledge of the Army bakery equipment, his baking skill, his executive ability and his general grit. The men took a keen interest. I well remember the first test of all which was held in a heavy rain. The men were equipped with ponchos, but nevertheless got pretty wet. Within a very short time of the beginning of the test, a fire trench was dug in the soggy field, the field oven put together over it and a roaring fire built. The rain drops hissed as they hit the oven like water thrown on a hot stove. The tent was soon pitched, flour and other ingredients unloaded and the dough mixed.

Now the hardest work was over and three of the men could lie down for a few hours' rest while the fourth stayed on duty to punch down the dough, and keep the fire burning under the oven with wet logs.

Makeshift Ovens

Other work which demonstrated how important a factor the baker is in bread baking were experiments with the baking of bread without a regular oven, constructing a make-shift oven of any material at hand. This was done in several ways. For example, a cavity was dug in a bank and provided with a "chimney" by digging a connecting hole down from the top. In this, a fire was built. When the cavity was well heated, the fire was withdrawn, the dough placed therein and all outlets closed.

If properly done, the bread bakes nicely. The ground, however, takes a surprisingly long time to get thoroughly dried out and heated through. If the earth was wet, two days' preliminary

heating was sometimes necessary. Expedients of this kind where the fire is built inside and later withdrawn always tend to give more top heat than bottom heat, as the bottom soon becomes covered with ashes and so partially protected from the direct heat of the fire, whereas the flames play right on top of the chamber.

In a good clay soil, an excellent oven can be constructed above ground, using a barrel as a form around which to mold the clay. When the clay has dried, a fire is built inside, burning out the barrel and hardening the clay. A slow fire is necessary at first to avoid cracking. This method turned out fine bread, though the amount of labor and fuel required is large compared with the amount of bread which can be produced.

Faithful Service

Bakery Company No. 11 baked bread for 50,000 troops continuously for nearly a year, after which it was ordered overseas. During its stay in the United States, the company was used also for training other bakers, several hundred of whom received their knowledge of army baking in this organization.

A Bakery Company is made or marred by its sergeants. Bakery No. 11 was unusually fortunate in this respect. First Sergeant Boyd*, Sergeants Callahan*, Nihof*, Jarboe, DeKock, Kelley, Platt, Johnston and McConnell, to mention only a few, were the backbone of the Company. Throughout the war, these and other members of the Company performed with the utmost willingness the arduous duties described above. There was no chance for decorations and little glory, but these men performed a very real service to their country, in baking good bread for many thousands of soldiers for more than two years.**

*Later Commissioned.

**The writer would be glad indeed to hear from any former members of his old Company. Address him care Merrell-Soule Co., Syracuse, N. Y.

Possibly, in the foregoing, there are suggestions and even a moral or two which may be of value to those of us who are now connected with the baking industry in civilian life. The principal lesson which army bakers have to teach their civilian brothers is probably that of "resourcefulness." Results must be obtained regardless of difficulties.

Of Present Importance

This subject is one of present importance. One of the major problems in warfare is feeding the troops, and in the ration, bread very properly has a large place. With great foresight, therefore, Field Bakery Companies in the Reserve Corps of the U. S. Army, have been organized at the American Institute of Baking and elsewhere. September 12 has been named as the day for a Test Mobilization of these and all other units of the Reserve Corps. On that day, it will be interesting to see what steps have been taken to bake Uncle Sam's bread in time of war.

Many of the problems a baking company must attack are of practical interest to the baker in civilian life.

Personnel and Equipment

A bakery company is composed of one commissioned officer and one hundred and one enlisted men. One company is supposed to be capable of baking bread for a Division of approximately 33,000 men. The company is made up of fifteen "units." Each unit is complete in itself from a baking point of view and is able to bake bread for detachments of troops of 2,000 men. When such a detachment of soldiers is operating separately, one unit of a bakery company may be attached to it for the purpose of providing it with bread.

The personnel of a unit consists of 1 sergeant, 1 corporal and 4 privates. The company as a whole is provided with a

commanding officer and also a first sergeant, supply sergeant, mess sergeant and cooks in addition to the fifteen units.

Besides such articles as tents, etc., the important items of the equipment of each Unit of Baking Company are:

- 1 Axe
- 3 Buckets, galvanized iron
- 7 Cans, sponge
- 2 Covers, canvas for dough troughs
- 3 Covers, canvas for bread racks
- 2 Lamps, acetylene
- 1 Measure, gallon graduated
- 1 Oven, field complete
- 36 Pans, bake 12x24 inches
- 1 Pickaxe
- 3 Racks, bread folding
- 1 Scale
- 1 Scoop, cast aluminum
- 1 Scraper, dough
- 1 Shovel
- 1 Sieve
- 1 Stove, Sibley
- 1 Table, molding
- 2 Troughs, dough

Ingenious Equipment

The construction of some of the equipment is very ingenious. Portability must always be kept in mind. For this reason the dough troughs and molding tables have folding legs and the bread racks are collapsible. The most interesting piece of equipment is the field oven which can be set up in any field for baking and taken apart for packing when the baking is over. Including the stove pipe, it consists of only 12 separate parts.

These field ovens are three deckers, standing about five feet high and covering ground space 6 ft. x 8 ft. They are set up out of doors without shelter of any kind. A trench is dug in the ground beneath them in which the fire is built. This is usually of wood, but coal or oil may be used when special grates or burners are available. The work which these

ovens will do in all weathers and operating under the most adverse conditions is truly remarkable.

Army Bread Formulas

Bread is mixed by hand and fermented in the dough troughs. A rather lean formula was used, such as:

- 160 lbs. Flour
- 2 lbs. Sugar
- 2 lbs. Salt
- 2 lbs. Cotton Oil
- 1½ lbs. Compressed Yeast
- 11 gal. Water

Fermentation Time, 4 Hours

After fermentation, dividing, rounding, molding, etc., in the usual way, the dough is placed in pans and these are put on the racks for proof. To provide heat and steam, bread pans half full of water are put under the racks and pieces of iron heated to redness in the oven fire are thrown into this water. This is the oldest method in the world for providing steam, but it proves perfectly satisfactory for this purpose. To keep in the heat and steam, the racks are provided with canvas covers. This method of securing a steam-proof could be adopted with little expense and considerable advantage in more than one civilian bakery not equipped with the latest (though expensive) steam-proof boxes. The same may be said of some of the other expedients which army bakers are forced to use.

Two-pound loaves are made and these are baked six together in a flat bake pan. The bread is usually issued to the troops in "sheets" composed of six twin loaves.

The cost of bread was calculated each month and found to be in the neighborhood of 2c a pound. Lest civilian bakers should take fright at these figures, it should be stated that these costs were arrived at by Uncle Sam's own private method of calculating. The so-called "cost of bread" included merely the costs of the ingredients which the bread con-

tained. There was no charge whatever made for labor, equipment, or fuel, and of course, no selling cost or profit had to be added.

An Interesting Loaf

A loaf of extraordinary interest was the "field bread." The object of this was to make a loaf which would withstand the hard usage, exposure, and many a days' or weeks' delay which often necessarily occurred between the time that bread was baked and the time when it reached the hands of the ultimate consumer, who might be the soldier in the trenches.

Field bread was made of the following formula:

Army Field Bread
105 lbs. Flour
3 lbs. Sugar
 $\frac{1}{2}$ lbs. Cotton Oil
2 lbs. Salt
 $\frac{3}{4}$ lbs. Compressed Yeast
 $6\frac{1}{2}$ gal. Water

Mix into a very stiff dough. Dough should be ready for the first punch in $4\frac{1}{2}$ hours. Punch the second time after one hour. Scale at $4\frac{1}{2}$ lbs. Flatten out into circular loaves about 10 inches in diameter and $1\frac{1}{2}$ inches thick. Allow only 15 minutes proof in the pan.

Just before baking, docker holes are made in the top of loaf with thumb or with a stick. This prevents blistering and breaking of the crust. An important feature is the long slow bake for an hour and a half at about 475° F.

The result is a circular loaf about 11 inches in diameter and 4 to 5 inches thick, which has a thick hard crust, reminding one of the shell of a turtle. This crust must be unbroken so as to keep out molds. It must be hard enough to resist crushing and to withstand almost any abuse in transportation and storage. Field bread is expected to keep fit to eat for four weeks after baking, and will do so

when properly made. Due to the prolonged baking, it has an unusually sweet, nutty flavor when fresh, superior to any bread I have ever eaten. The hard crust and close texture retain the moisture and freshness for a surprising length of time.

Here is a possibility for civilian bakers looking for an entirely different loaf as a specialty.

The best existing description of army bread baking and raw materials is undoubtedly the "Manual for Army Bakers," obtainable from the Superintendent of Documents, Washington, D. C. It is well illustrated and will make interesting reading for anyone connected with the baking industry—especially anyone who may look forward to being called for service in a national emergency.

Another Press Whirligig

THE San Francisco News has run through the same old course that so many similar crusades have gone, a series of reportorial attacks on the baking industry, based on charges of gross profiteering.

The News found that army bread cost 2 cents a loaf and 3 cents a loaf, and raised a cry about that. The American Institute took the matter up and inquired at Army Headquarters. There we found that the 2 cents is merely a matter of apportioning the daily ration money of the soldier. Nothing is counted in save the mere flour and yeast cost to the army, and if that is 2.49 cents per loaf, they charge it at 2 cents, because in dividing the soldier's allowance for food they never use fractions of cents. They count on "the plusses to pick up the minuses," and find that this happens. They count in no expenses for plant, for help, for bakery personnel, for taxes, for repairs, or for oven and fuel expenses. All those matters go to other cost sheets. The labor is

furnished from the enlisted personnel, and there is always the guard house at hand for the soldier who doesn't like the bakery work. The quartermaster furnishes all equipment and charges it to his own accounts.

All these facts were submitted to the News. We heard no more of the cry about army bread. The flour cost is not essentially different from the flour cost to the average baker who has to meet expensive manufacturing conditions imposed upon private business if it would produce a desirable product.

The News then found a baker who offered bread at 6 cents a loaf and charged that 9 cent bread represented "too great an investment in machinery." The American Institute took up this matter and informed the News that there could hardly be such thing as too great an investment in machinery, as in every city where modern plants had been built to spend much more money than was formerly thought necessary on a loaf of bread, the people had responded by buying this better loaf.

The Institute invited the News to buy a dozen loaves of the 6 cent bread offered to it by the baker who thought 9 cent bread represented "too much machinery," and tender its own staff a luncheon, using both types of bread. We suggested a registration of votes afterwards as to which type of bread those present desired to buy as a steady diet.

We suggested that the editor of the News take note of the fact that the "big baker with the heavy machinery investment" **had the trade**, and the little baker who thought he was all wrong, **had his theory**. So nothing more was heard from the News about the glories of the 6 cent loaf, hand made, in a plant unprotected from violent changes in weather.

The News then switched over to a general outcry in favor of home baking. The

Institute took up this matter with them, pointing out that a single modern oven, with heat under absolute control, could do the work of 4,500 women in 4,500 different stoves, each bucking back in its own way and backed by kitchen fermentation conditions that could no more be controlled than is the shop of the hand-power baker. We pointed out that the housewife always counted herself "lucky or unlucky" with her bread and that on unlucky days she got flat, sour, bad flavored, or crumbly bread without ever being able to tell why. We suggested that in contrast the big bakery that had fermentation room control knew no such thing as luck but scientific accuracy produced the same excellent loaf in every batch, and brought it through every baking in the same excellent condition.

As women knew this to be a fact, we suggested it would be a pretty hard task to drive her back to the foolish nonsense of hand-power baking in the kitchen. The News attack perished with this final salvo.

Now comes this letter from R. J. Workman of the California Bread Co., which was the center of the newspaper attack.

"As I see it, the people are willing to pay for good bread just as they are willing to pay for good shoes or anything else, and the fact that we bake 100 barrels of flour to every one barrel baked by the 6-cent baker the News speaks of, shows that the people agree with me. As I told the representative of the News who followed its series of attacks by soliciting my advertising, the people are not forced to pay 9 cents a loaf for bread, but do so of their own free will with plenty of 5 and 6 cent bread in the market. **It pays to pay money to make good bread.** I am keenly interested in the growth of the Institute and congratulate Dr. Barnard and its staff on the fine work being done."

Books for the Baking Laboratory

THE ROMANCE OF THE HOLES IN BREAD. By I. K. Russell, Chemical Publishing Company, Easton, Pa. 200 pages, with portrait of Louis Pasteur and introduction by David Starr Jordan.

Of this book by a member of the staff of the American Institute of Baking the following review was published in the *Northwestern Miller*.

I. K. Russell, editor of *Baking Technology*, and author of "Hidden Heroes of the Rockies" and "Frontier Tales of the Townsend House," is adding a third volume to his list of published works. "The Romance of the Holes in Bread," is a "plea for recognition of the scientific laboratory as the testing place for truth."

"Ike" Russell, as he is called in a foreword by David Starr Jordan, is a graduate of Stanford University, and he is described by Dr. Jordan as a good student, "with a 'flair' for originality." This quality is evident in Mr. Russell's conception of the book and its title. In its pages he presents a lucid, imaginative and even romantic account of the science of bacteriology and its modern application.

The book naturally centers about the great figure of bacteriological science, Louis Pasteur. It is a document of biography and appreciation, presenting the achievements of this wonderful scientific discoverer, which began with his part in solving the mystery of the holes in bread.

"All over America," writes the author in his opening chapter, "Louis Pasteur's name is a household word because it comes to the home every morning in the form of a cap on the family milk bottle. The cap bears the word 'Pasteurized.' And every boy who ever feared a mad dog's bite knows that boys and girls who have been bitten by mad dogs have been rushed away to a Pasteur Institute to be cured before the deadly rabies set in to terminate their lives. These great achievements they have not associated, perhaps, with the holes in bread. Yet it was in the study of bread that the initial great discovery was made."

The tale of the discovery of those giants of the bacterial world, the yeast germs, is dramatically unfolded, and following after it the struggle of Pasteur against the error and prejudice of his times. Justus Liebig's "spontaneous generation" theory is laid low, and the new Pasteur idea of bacterial infection from the air develops. It is carried on through a memorable chapter on "Finding the Source of Plagues," and finally to the

great commercial and agricultural uses involved in the proper fermentation of wine and the treatment of anthrax in animals.

The seemingly simple but momentous step from the lesson of the bake oven, where armies of bacteria have been destroyed in the bread loaf, to the baking of bandages and instruments in the surgical room, is forcefully emphasized, and there is eloquent appreciation of the work of those who have carried on the Pasteur ideas in recent times. Among these men is Dr. Jordan, who has done so much toward the advancement of the Pasteurian ideas at Stanford University.

One of the concluding chapters is devoted to the work of Max Henius, which culminated in the establishment of the Wahl-Henius Institute of Fermentology in Chicago. When the author first met Dr. Max Henius he found in his institute a stained glass window. It was such a window as cathedrals have. On the glass was a saint—a perfectly orthodox cathedral saint except that upon the head, where a halo would normally be, was a wreath of barley, and in one hand a Pasteur flask. It seemed a sacrilege. Then he learned how Dr. Henius and his associates had fought Chicago's typhoid plague—and had conquered it. And it no longer seemed a sacrilege; "it had been built in a true spirit of devotion."

The evolution of the yeast cake and the adoption of chemical laboratory science in the modern bakery is the theme of the last chapter. The story of co-operation among bakers to end their troubles with rope and mold, and "wunderblut," the red spots upon bread, is also told. The climax to this part of the tale is familiar to all bakers—the purchase of the Wahl-Henius Institute and the establishment of the American Institute of Baking, together with the acquisition of America's largest library on fermentation.

Through such recognition of the truths of science, the author concludes, has the modern scientific baking industry come into existence, "with a chemist at the bakery's heart, a bacteriologist at his right hand, and great machines to do with mechanical perfection what formerly was done intuitively by hand." Through such steps has the "romance of the holes in bread" been brought home to the baking room where it gained "its world-encircling start in the first place."

C. K. M.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Vitamins and diabetes. Klotz and Hopfner. Munch. Med. Wochschr. 69, 465-6 (1922); Endocrinology 6, 679.—Vitamins influence metabolism. The Ca metabolism in rickets is improved when fresh extracts from sweet potatoes, turnips or carrots are given. It was found that extracts from sweet potatoes in not too large quantities diminished the sugar in the blood and urine, but yeast had no influence. However, Borutteau (C. A. 13, 2065) proved by much more extensive experiments the existence of antidiabetic substance in these vegetables and in yeast also.

Detection of milk in pastry. G. Kapeller, A. Gottfried and W. Reidemeister. Z. Nahr. Genussm. 45, 65-9 (1923); cf. C. A. 15, 1949; 16, 3516.—Baked products made with and without milk were examined for total alkalinity of the ash and CaO content. The alkalinity of the ash of white flour products made without milk is usually below 2.0 c.c. N NaOH per 100 g. of dry substance. When milk is used this volume ranges from 2.0 to 4.3 c.c. The CaO content (mg. per 100 g.) was rarely above 100 in the absence of milk solids and rarely below 100 in their presence.

D. B. Dill.

Correlations between various characters of wheat and flour as determined from published data from chemical, milling and baking tests of a number of American Wheats. Jacob Zinn. J. Agr. Research 23, 520-48 (1923).—A study is presented of the relationship of the different characters of wheat such as crude protein contents and of the protein, gluten and gliadin contents of flour, volume of loaf, etc., based on published data obtained from the analyses of a number of American wheats.

F. C. Cook.

Contribution to the study of vitamins. Pierre Lavialle. Compt. rend. soc. biol. 89, 1031-3 (1923).—The antineuritic and antiscorbutic vitamins of milk are completely destroyed by raising the temperature to 140 degrees or by dessication. At 105-110 degrees there is no complete destruction, but the two vitamins greatly diminish, depending on the length of time of heating. The fact that infantile scurvy is a relatively rare occurrence considering the enormous quantities of pasteurized milk consumed is accounted for on this

partial destruction. Only in infants weakened by disease, whose tissues are deprived of the antiscorbutic supply, does sterilized milk produce scurvy. Drying at ordinary temperature and in the air does not destroy the antiscorbutic factor of germinated cereals.

S. Morgulis.

Unpleasant consequences of vitamin investigation. 1. Nutrient-salt-vitamin-food "Schacke." A. Beythien and P. Pannwitz. Z. Nahr. Genussm. 46, 309-11 (1923).—In the rapidly increasing sale of prepared foods exploited for their vitamin content lies the danger that the consumer will be led to overlook the sufficiency of the normal diet with respect to vitamin content.

L. D. Elliott.

Vitamin B content of white bread. G. A. Hartwell. Biochem. J. 18, 120-6 (1924).—White bread (provided yeast, and not baking powder is used) contains sufficient vitamin B to supply the needs of a rat.

Benjamin Harrow.

Patents

Treating flour. T. Clarke. Brit. 207, 402. Dec. 27, 1922. Flour is subjected successively to treatment with Cl and N peroxide or vice versa. The treatment prevents loss of brightness and increases the bleaching and conditioning effects. Cf. 165, 149 (C. A. 16, 598) and 205, 200.

Food product rich in vitamins. N. Minnberg. U. S. 1,479,418, Jan. 1. The starchy portion of whole grains such as wheat is separated from the vitamin-containing portion and cooked, then mixed with the vitamin-containing portion previously separated and the mixture is dried at a temperature so low as not to destroy the vitamins.

Bread dough. W. A. Darrah. U. S. 1,468,775, Sept. 25. Dough for bread (or cake or other bakery products) is prepd. with an excess of H₂O, to insure thorough hydration, and the excess moisture is removed from the dough by evapn. The evapn. may be induced by forcing small streams of air through shredded portions of the dough. Dil. NH₃ soln. may be used in small amt. as an alk. dispersing medium to facilitate the dough prepn. and in case of this or similar alkaline treatment of the dough it may afterwards be neutralized by the use of CO₂, or HCl (which may be added to the air current used for treating the dough).

Guessing Wrong About Flour

A BAKER found his bread was spoiling with rope—and called up the flour man. He blamed the flour and ordered all that he had on hand taken away. But the flour man was hardly willing to do this, and a loaf of bread from the offending flour was sent to the American Institute, together with a sample of the flour, for analysis.

Now any experienced microscopist could have examined a sample of flour and he would have found in it the tiny seeds known as the spores of *bacillus mesentericus*,—which when they find conditions suitable to their growth, cause the disease known as rope. He could have also found the much larger seeds of molds.

A report that these things had been found would no doubt have seemed a total condemnation of the baker's flour. But when it is understood that all the flour ever milled in the world could be similarly condemned, and all the air we breathe found unfit for breathing on a similar test, it ceases to mean anything.

As the American Institute had conducted hundreds of tests, all of which showed that the mold seeds were killed, without growth, by the oven heat during baking, and the rope seeds could easily be controlled by changing the hydrogen ion concentration of the dough batch, no letter condemning this baker's flour was sent.

He was told instead to thoroughly clean up his bakery for the mold seeds growing upon his loaf came upon it via the air and dust, **after baking**. We assured the baker that no mold seeds in the flour could possibly harm the loaf, any more than wheat seeds would grow after being boiled into a mush, or baked into a black char.

Now it is well known that when a sick

man calls a doctor he thereafter takes the word of the doctor, whose patient he becomes. Or if in legal trouble he takes the advice of the lawyer he calls in. But this baker was one "who had a mind of his own." He still felt that the flour was to blame and that by getting rid of the offending flour he could get rid of the offending mold and rope.

In the past that was the best any baker could do. We knew one baker who was about to do this when a friend pointed out to him that the dark walls of his storage room were black and slimy with mold, and this mold was ruining his flour and baked bread as well by infecting every loaf, through its floating seeds, **after baking**.

This baker had his storage room walls washed down, and ventilators installed to keep them too dry to grow mold—and his flour then became all he could expect of it. But in this latter case the baker would accept no such responsibility for his shop.

"Your report sounds like bosh," he wrote back to the Institute, "I have never had rope and have never used vinegar. I believe the flour is no good."

It created the impression here that the miller had been wronged and had been made the scapegoat for conditions the baker should have mastered within his shop. He even sent us another loaf—to prove that no rope existed after he had acted according to his own lights. **But rope did exist**. The sample sent was ropy and it was returned so that he might see this for himself, and smell it too. He had been incubating a milder attack than he had been able to recognize or identify. Through such problems the light of the Newer Day will find its way.

BAKING TECHNOLOGY

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in Baking*



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Our New Pasteur in Bronze

IN beautiful ceremonies which marked a new wedding between Science and our Industry, the American Institute of Baking received a bronze bust of Louis Pasteur from Copenhagen on Tuesday afternoon, September 16.

The occasion wedded not only Science to the Baking Industry, but it brought home to the American Institute a new link of esteem and contact with Dr. Max

Henius, who had built the structure in which our Institute is housed. He had built it as a temple for housing scientific research for another branch of the fermentation industry.

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In turning it over to the baking branch of this same industry, Dr. Henius had parted, he thought, with many precious memories. He had taught Pasteur and Pasteur alone in this institute, except as Pasteur had expressed himself through certain students of his, who had "carried on" at the Carlsberg Laboratories. Among these were Hansen, segregator of yeasts, one strain from another, and developer of the

science of pure culture of yeasts.

In those days there had come to the Institute to study under Dr. Henius two delightful young Danes. Romance here enters the story of the beautiful bronze

bust of Pasteur now on exhibit at our Institute, for these two young Danes soon learned to love their American preceptor, a Dane transplanted to the soil of Chicago. In their high regard for him they only shared the love of the whole Danish colony in Chicago. And of this colony Dr. Henius had long been the beloved leader whose friends were as numerous as the knowledge of Dania in our Illinois commonwealth.

The young Danes returned to Copenhagen, became prosperous as descendants of a long line of leaders in Copenhagen life—as descendants of Captain Jacobsen, the famous donor of public parks, museums, art galleries, and the Carlsberg laboratories to Copenhagen.

A year ago while on a trip abroad Dr. Henius met his former students, and in the conversation that resulted they learned of his wish to see a bust of Louis Pasteur set up in the halls where he had once presided as a teacher and research leader in fermentology.

The Jacobsen boys responded promptly to this wish. And here again enters one of the richly romantic chapters in the rise of Louis Pasteur as a world-accredited scientist.

It is easy now to point back to him after 100 years and state boldly that he revolutionized man's attitude towards nature, stilled his quaking fears about the causes of plagues, gave him eyes to see the folly of many religious superstitions, and took the mystery out of myriads of so-called miracles.

But there was a time in the rise of Pasteur as a revolutionary who was throwing Aristotle's philosophies into the discard, and exposing all the favorite quackeries of medicine, preparatory to starting a new scientific medicine, when few were so brave as to do him honor.

While all of the older orthodoxies were combined in their hatred of Pasteur, there

arose in Copenhagen a man who caught the meaning of his message.

This man, Captain Jacobsen, had money, and much of it he had earned by applying the Pasteur lessons to his industry. He had thus learned to save forty per cent of his product that had formerly been thrown away to putrefactive bacteria, just as a vast amount of bread had been surrendered to the ravages of rope and mold bacilli.

With his money he invested in art works to honor Pasteur. He asked the foremost French sculptor of the day to make him a bust of Pasteur. And this is the same bust which today lives on in Chicago as an inspiration for all workers in the National home of the baking industry.

Not only did Jacobsen have a bronze bust of Pasteur made by Paul Dubois, foremost Academy winner of the hour, but he had a beautiful portrait in oil made by a celebrated painter.

Twenty years later all the world wished to honor Pasteur—but he was dead. And when a search was made for art works that adequately proclaimed his greatness this bronze bust made for Captain Jacobsen, and this oil painting made for him—showing Pasteur with his hand resting lovingly on the shoulder of a little grandchild—turned out to be the finest bust and the finest painting in existence.

The Jacobsen family, as custodians of these art treasures shared the bust with America, and made the American Institute of Baking its American repository.

Thus was the life of Max Henius linked back again with the life of Helge and Vagn Jacobsen, his former students, and with the American Institute, whose halls, library, and class-rooms are to him very sacred places.

Not only had Captain Jacobsen brought the best sculptor and painter of his day into the service of honoring Pasteur, but,

industrialist though he was, he saw that Louis Pasteur, in discovering what caused the holes in bread and the bubbles on beer, had thrown ajar gates beyond which a new world lay awaiting discoverers, armed with microscopes and intelligence.

But such potential discoverers needed a plant to work in. Pasteur had made his great discovery of the nature of yeast in a hot garret out of which he often had to retreat, because of the unbearable heat, when half-way through his most important experiments.

The world had known the armory through which hard-boiled Rome had risen to power, and had sent out generals to drag kings of lesser nations, chained to chariot wheels, home to Imperial Rome.

Weaker peoples had combined against the armory, and had preached that the use of power must be allied to **conscience**. They had built cathedrals to give their preachers a proper pulpit. And in cathedrals lesser peoples had learned about conscience, heart, and soul. These qualities had been glorified.

But neither devotees of force nor of religion knew the laboratory as a testing place for truth. Religion did not have eyes to see the truths of science, and there was yet in the world no advocate for the experimental method of determining facts. The very word "bacteriology" was still "slumbering in Greek lexicon, its component parts far separated," as David Starr Jordan has said in a fine tribute to Pasteur.

And into this world came the far-seeing Jacobsen who dared to erect a "Laboratory" in Pasteur's honor and hunt up the finest men he could discover to carry on in the development of this young science of bacteriology.

Capt. Jacobsen not only did that, but he went far afield from those branches of science in which he could personally

profit. He gained something of the Pasteur vision and wanted to become a benefactor of the world himself, through those who at the Carlsberg laboratories should pass beyond the frontiers of the known, into the realms still unconquered by man. Thus the Carlsberg laboratories set out upon their work of contributing famous Danes to all the world.

And it was one of these, the present head of its Division of Chemistry, Prof. Sorensen, who came from Carlsberg to speak at the exercises in unveiling the Pasteur bust. He found on his way to Chicago vast laboratories in each great city, all now working in that trilogy of force centers of our world—the **armory**, the **cathedral**, and the **laboratory**, the armory to give our civilization power, the cathedral to give that power conscience and soul, and the laboratory to give both eyes.

In the laboratories of the American Institute of Baking Prof. Sorensen found a welcome and was at home. In the office of Dr. Henius in our National home of the baking industry, he found a countryman's welcome. In the unveiling exercises he found an audience of American scientists to hear his tribute to the master, Pasteur. It is printed in full in this number of this magazine. And it is recommended as good reading to all who profit by bread baked under conditions of mold, rope, and yeast control.

When the bust was set up first at the Institute, it was on a table where Miss Rosabelle Pridatt, librarian, had arranged from the Institute library, the famous works on fermentation. Most of them were by scientists from the same Carlsberg laboratories from which Dr. Sorensen had come.

When he left there was still another task ahead of him—to appear before the baking industry as a whole at its Atlantic City convention.

The Unveiling Exercises

THE unveiling exercises at the Institute occupied two hours from 2 P. M. to 4 P. M. Tuesday afternoon September 16.

The bust itself was placed in the east class room on the third floor, with the American flag draped over it. On the right was the French flag and on the left was the Danish flag.

Speeches by the Danish consul and the French consul gave the international setting to this wedding of Science with our Industry.

About two hundred guests, many of whom were well known in America for their scientific achievements, made up the audience.

Strains of the Star Spangled Banner, followed by the Danish national anthem and then the French national anthem, set the spirit for the occasion. Floral decorations set off the aged bronze bust in a truly inviting manner. They had been brought by special express from a specialist's farm at Watervliet, Michigan, with gladiolas in royal bloom as the flower most featured.

The speeches were six in number. Dr. Barnard presided as director of the Institute, Dr. Max Henius presented the bust on behalf of the donors, President Raymond K. Stritzinger of American Bakers Association accepted it in a noteworthy statement of the new role of science in baking, while A. Barthelemy, the French consul, and R. Baumann, the Danish consul, voiced the interest of their respective countries in the event. Dr. Sorensen concluded the program with his address on the contribution of Pasteur to the scientific enrichment of the world. The various speeches are given herewith as a permanent record of the occasion.

A deed of gift, itself a beautiful piece of work, accompanied the bust. It will be preserved in the Institute archives.

Private and public dinners to Dr. Sorensen concluded the events of the week of the bust's reception.

Science in Industry

DR. BARNARD, in opening the unveiling exercises thus described the relationship of science to industrial production:

We are apt to think of industrial science as an achievement of recent years. We measure our scientific progress by the strides set by the industrial developments which were forced in the hectic years of the great war. We speak of the chemist in industry just as we appraise the value of the latest invention, accepting him and his benefits while still wondering just how he functions.

And yet we meet here today to honor a man who more than fifty years ago was building the foundations for industrial research and linking the service of the laboratory to the prosperity of the vineyardist, the salvation of silk culture, the eradication of animal disease and the science of antiseptics.

During the past year the centenary of Pasteur was the occasion for worldwide recognition of his inestimable contributions to chemistry and to medicine. The lustre of his achievements could not be brightened by the fitting ceremonies which honored his memory. That were impossible, for several generations of scientists have bowed in reverence to the master. But the centenary did most definitely set out the value of Pasteur's work to industry and earn for him among the masses the same high honor accorded him by the scientific world.

Forty years ago a bust of Pasteur by Paul Dubois was placed in the Glyptothek of Copenhagen and a replica in bronze set at the entrance to the Carlsberg brewery at Copenhagen to commemorate the services Pasteur rendered the brewing in-

dustry in his studies of pure yeast cultures. The owner of that brewery was J. C. Jacobsen, a personal friend of Pasteur's and a man who so appreciated the value of science in industry that with the first money he could spare he founded the Carlsberg Laboratories.

These laboratories, directed by Emil Christian Hansen and now by our distinguished guest, have made a permanent mark on the scientific record of Europe and of the world. In them the work of Pasteur has been continued and from them have come notable contributions to science. The Carlsberg Laboratories are still maintained by funds provided by the son and grandsons of Captain J. C. Jacobsen and the present members of the family are serving science and humanity in the same generous way as the founder.

Thirty years ago the spirit of research, developed in the laboratories and universities of Denmark and Germany, took definite form in this country and the Wahl-Henius Institute of Fermentology became the scientific station of the brewing industry. To the school maintained by that Institute came Helge and Vagn Jacobsen, grandsons of the founder of the Carlsberg Laboratories. In that school they learned to honor the men who built it and made it notable. And when they returned to Copenhagen to carry on the work of their fathers they remembered with a lasting affection the Wahl-Henius Institute of Chicago.

In the changing course of events the Institute of Fermentology became the Institute of Baking. The study of malted and mashed cereals, fermented by yeast in a liquid phase was succeeded by the study of milled cereals, fermented by yeast in a more solid phase and prepared for consumption by baking. The science of brewing, so notably advanced by Pasteur and by the Jacobsens, left the laboratories and lecture halls, and the science

of baking, still immature, still experimental, still hesitating between the practice of the craftsman and the theories of modern chemistry, took its place. But the fundamental studies of Pasteur still lie behind the work of the Institute. On the results of his discoveries in the field of fermentology and sanitation have been built our modern concepts of the science of baking.

In the Carlsberg Laboratories Dr. S. P. L. Sorensen and his colleague, Jessen-Hansen studied hydrogen ion concentration and proteids, two subjects which in the last few years have been of outstanding interest to workers in the science of cereals and of baking. And over here the Institute has endeavored to make some practical application of that work in the development of better bread. While through its students the Institute has sent out into the industry men who have knowledge of the science which lies behind the loaf as well as the skill necessary to its manufacture.

The spirit of Pasteur has been as dominant in the baking industry as it ever was in the brewing industry. And so as Helge and Vagn Jacobsen watched the changing events which transformed their school of brewing into the scientific station of the baking industry they were impressed by the fact that though the purpose of the Institute was changed, the same science developed by Pasteur furnished the motive and guided the work.

Prompted by a desire to give adequate recognition to this fact they, together with Poul C. Poulsen of the Carlsberg Fund, have donated to American Institute of Baking a replica in bronze of the bust of Louis Pasteur which for so many years has dignified and honored the Carlsberg Brewery.

We are gathered here today to dedicate this bust and so to bring to the scientists

(Continued on Page 264)

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

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SEPTEMBER 15, 1924

We Work Together

***To win through quality production
and the utilization of scientific research
a welcome for two loaves of wheaten
bread for every one that now finds favor.***

Baking Technology

THIS week sees the placing of another milestone in the progress of the baking industry. This milestone will not be an old fashioned stone marker; neither will it be one of the modern signs stating that "you must walk another mile to get a Camel." Rather it is of bronze and is in the form of the bust of Pasteur which is being unveiled at the American Institute of Baking as the gift of the Carlsberg Laboratories of Copenhagen. It marks an epoch in our history when the scientific world so recognizes our importance.

Moreover, this bust is more than a marker showing advance in the baking industry. It is more than a tribute to the "footprints in the sands of time" left by a distinguished scientist. It is a permanent source of inspiration to the staff and students of the Institute and to the lay member of the industry. In conjunction with I. K. Russell's "Romance of the Holes in Bread" it will ever remind us of the trials and vicissitudes through which

Louis Pasteur passed as a pioneer. He was subjected to the same kind of ridicule and malignity which was early heaped upon the pioneers of science in the baking industry. But he lived to see his actions vindicated just as many of our own pioneers are seeing a general recognition of their splendid vision for the advance of their entire industry.

RAYMOND K. STRITZINGER,
President.

At a Parting

IT IS told of Thoreau, when this New England philosopher was living at Walden pond, that a farmer watched the "queer old nut" in his rude shelter and came over to ask him what he was doing there.

"I am writing," replied Thoreau.

"What for?" slurred the farmer.

"For future generations."

The reply of Thoreau settled all queries in the farmer's mind as to the philosopher's sanity. He fled, and thereafter spread evil and suspicious stories about the man who had become absorbed in watching wild life and God's glory as shown in beautiful flowers and shrubs.

Yet how truly Thoreau spoke. He had his mind fixed on one idea and lived for it and through it—and it still lives through his writings to countless hosts of our young.

Just so many leaders have set their hearts on marshaling the baking industry behind the nucleus now offered by our Institute. They live for that ideal, and many come to ask, "What for?" But that does not deter. To one of these who now joins the long procession of past presidents, we wish the best of luck, and on our part we carry forward a complete sense that his services cannot die.

New Light at Home

IN ALL his life which was devoted to *giving* to mankind, never in being on the make, Pasteur did not waver from the ideals that led him. He learned the secret of making good vinegar by looking into the glass of that spoiled product which was brought to him by M. Bigo, a troubled peasant. He found an invading, putrefactive bacteria, and taught the peasant how to keep it out of his product. He then turned to other peasants in trouble—those who grew silk worms. He found the germ that sickened their money-makers, isolated it, immunized the worms, and turned to the glasses of spoiled beer the brewers brought to him. He found the germ, built up protection against it—and turned to sick mothers in maternity hospitals.

"Why do you not make money out of your services?" asked the Empress Eugénie when Napoleon III received a check for 22,000 francs, the first revenue from his mulberry groves in a decade. She knew that Pasteur had created this revenue by conquering the pébrine (pepper) disease. "Because," answered this great giver of blessings, "I must keep my mind free."

And with a hot garret for a laboratory, or else a dark room under a staircase, he pressed on to give mankind other gifts. There were plenty in his microscopic slides, for he brought in rapid order, cures for poultry diseases; for rope and mold, the diseases of bread; for the red plague of the swine herds; for anthrax, the cattle plague; for child-birth fever; for cholera, for hydrophobia, for yellow fever, for souring milk, for spoiling wine.

"Here reposes Pasteur," is the simple line across his crypt in the Pasteur Institute at Paris, reared by contributions from nations he had served in every portion of the globe.

Now in our American institute he lives on—the father of modern scientific baking, and the rich tints of his bronze portrait will

color the life of every student who gazes upon it. President Stritzinger rightfully said that the setting up of our bronze bust of Pasteur, a gift from the members of the Jacobsen family in Copenhagen, marked a new epoch in baking—a new striking of hands between Science and our Industry.

Our Trade Press

AN ORCHESTRA of any kind can play better than an isolated bass drum, or a lone fiddle, however taut its strings. In the building of an industry many instruments join in the orchestration which finally rises to concert pitch, and thrills all about with its harmony.

In our own industry the trade press plays a role beyond estimates that can be set down in ledger or day book. Veteran editors such as Klopfer, Clissold, Ament, Ireland, Craig, Sawyer, Clark, of the seven larger bakery journals, and their host of fellows in the milling, machinery, and supplies press, are all pushing towards a common goal of industrial uprearing.

Beneath their form of service old hatreds die, the spirit of fierce competition which vents itself in hatred of the competitor dies, and co-operation enjoys that young growth that means so much for tomorrow.

We have received from another industry a statement that a bulletin issued by the national organization has aroused the hostility of its trade press. "Should we take advertising?" the editor writes. The answer very decidedly is no, if the trade journals are thereby jeopardized. It was in recognition of the fine work of the journals in our own fields that the bakers decided to finance their own institute bulletin and put it to work in a field that could not otherwise be so adequately covered. We are proudest when the words that in this bulletin can reach a few at best, are re-broadcasted to those with each trade paper's receiving sets.

(Concluded from Page 261)

of America an appreciation of Pasteur as the chemist and fermentologist whose researches made possible the development of a scientific industry out of the craft which for thousands of years has moulded and baked the bread of mankind.

The Reign of Service

PASTEUR, the Frenchman, who can help the world unite after its dark days of warfare, was thus described by A. Barthelemy, the French Consul:
Dr. Barnard, Ladies and Gentlemen:

Years ago, at a time when I was connected with the Paris Exposition of 1889, if somebody had told me that a day would come when as French Consul in Chicago I would take part in such a ceremony as this, nothing could have exceeded my surprise. It was then that I made the acquaintance of Mr. Carl Jacobsen, father to the generous donors of the bust which we are dedicating this afternoon. The year before, in 1888, Mr. Jacobsen had organized an exhibition of French art in Copenhagen, and the Committee formed to select the works of art had Pasteur as its honorary chairman. Mr. Jacobsen loved Pasteur and he loved France with a love which he took every opportunity of showing.

Pasteur was a Frenchman and it is because he belonged to the country which I have the honor to represent in your midst that I have been called upon to say these few words. But unless my knowledge of the world's history is more limited than I think it to be, I know of no man who has ever done more for humanity and whom the human race has more reason to admire and to revere. That is why a movement is on foot to erect a monument to Pasteur in Chicago and to establish a Research Scholarship which will be open to all American students in those sciences which

he has stamped with his genius. I commend that movement to your support.

Ladies and gentlemen, after ten years of war and unsettlement, the time has indeed come for peace. In order to hasten its advent let us look for what unites. I know of nothing that could bring us more together than the remembrance and the cult of those men whose unselfish lives have been devoted to the cause of humanity and who have helped man on the road he has to follow toward the establishment, which one day must come, of the reign of service and love.

Danish Consul's View

THE pride that Denmark takes in having been the first nation to discover and proclaim Pasteur's greatness to the world, was described by R. Baumann, the Danish consul at Chicago, in these words:

We are gathered here today in the light of a great name to witness an act of appreciation from scientific institutions of my country to a scientific institution of America.

It is highly befitting that this mark of appreciation should have taken the form of a visible commemoration of the man who by his work has contributed so much to the development of the industries for which those institutions stand.

It is most appropriate that the presentation of the memorial should be entrusted to an American of Danish birth whose ability, for many years, has been applied in lecturing, in this same building, on subjects connected with those industries.

I congratulate my countrymen on having with us a Danish scientist who, in his address, will be able to tell you all about Pasteur that should be mentioned on an occasion like the present.

May I be allowed only to refer to one trait in Pasteur's character which appeals pre-eminently to all of us irrespective of

what we may know of his scientific achievements: the inspiration which he, like other great benefactors of mankind, received from considerations far beyond personal satisfaction.

We understand and appreciate Pasteur when he commences the preface to one of his books with the words: "Our misfortunes inspired me with the idea of these researches."

We look around in our own countries for great men inspired likewise.

We know that the fate of any nation depends upon its ability to overcome the reverses that are sure to meet it some time or other.

We hope and pray that when misfortunes should strike our countries, great and good men may arise to their rescue.

Pasteur is the benefactor of all mankind; his work has benefited all nations, but the honor of having fostered him belongs to France. I am most gratified in seeing with us today the representative of that great country, and I thank him most heartily for having honored us with his presence on this occasion.

The Role of Max Henius

IN INTRODUCING Dr. Henius, Dr. Barnard thus sketched his early career, as it led up to his interest in seeing a bust of Pasteur placed in the American Institute of Baking:

Once upon a time a young Danish boy played in the distillery of his father and early learned the secrets of fermentation. His education was obtained in the schools of Aalborg and at the University of Marburg. In 1881 he came to America and took employment as a chemist for various firms.

In 1886, with Robert Wahl, he established the Wahl-Henius Institute of Fermentology. The first institute was in the rear of a drug store on Chicago Ave-

nue and its first work was as analytical and consulting chemists. A school for training brewers followed the operation of service laboratories and the Institute became a force in uplifting the industry.

With its directors it grew and sought new quarters. And again it outgrew its home and in 1905 the building in which we are gathered was built and dedicated to the services of the fermentation industry.

Through all these years Dr. Henius was a leader among the chemists of Chicago and of the United States. He was one of the early members of the Chicago Section of the American Chemical Society. I well recall the splendid way in which he, as chairman of the entertainment committee, officiated on the occasion of the meeting of the Chemical Society in Chicago in 1907.

When the time came for the title to Wahl-Henius Institute to pass to others, Dr. Henius rejoiced that the work he and his colleagues had so successfully carried on was not to cease but in slightly different form was to continue; that the library he had so loved was to serve the baking industry as it has so signally served the brewing industry; that the class rooms and laboratories where he had worked and lectured would continue to instruct young men in the science of a basic food industry.

While his work has gone on so successfully in this country, Dr. Henius has kept in close touch with the land of his birth and with the men who have labored there for the advancement of science and industry. He has taught the sons of the founders of the Carlsberg Laboratories and been intimately associated with their directors and workers. And with an appreciation of the value of the work of Pasteur to chemistry, to biology, to medicine and to mankind, he has looked for-

ward to the time when he might join in honoring Pasteur by the erection of a fitting memorial in the city of his success. That time has come.

On behalf of Helge Jacobsen, Vagn Jacobsen and Poul C. Poulsen, the donors of the portrait bust of Louis Pasteur we dedicate today, Dr. Max Henius, presents their splendid gift to the American Institute of Baking.

The Presentation

IN presenting the bust Dr. Max Henius, just back from Denmark where he had told his friends in that country what a glorious place he had found America to be, made a touching address. It was not written, but was intimately personal to the event and conditions surrounding it. He described the origin of the idea of presenting the Pasteur bust, and its fulfillment in the following manner:

The first idea of bringing the bust of Pasteur to the American Institute, came out of a luncheon at the Dania club about a year and a half ago. Dr. Barnard and members of the staff of the new Institute of Baking were guests of those who had been connected with the Institute of Fermentology.

A suggestion was made by a friend who had heard me speak of Pasteur, and who had been reading the books from our library which told of Pasteur's discovery of the nature of yeast. This friend, I. K. Russell, told me how he considered that Pasteur's "Studies in Beer," which he had obtained in our library, seemed to him one of the greatest books ever written in the history of the world, and that it laid down a new basis for Scientific Medicine, and a basis for the Science of Bacteriology, which we now recognize as playing the important role in matters of Public Health in our modern cities.

Russell suggested that it was a great pity that Pasteur was known only to a narrow circle of scientists, while to the masses to whom he had brought such signal benefits he was practically unknown. The 100th anniversary of the birth of Pasteur was then approaching and it was suggested that the scientists and the medical men, and members of industries that had benefitted by the Pasteurian discoveries, should unite in tributes to him. The French government soon afterwards began to foster a Pasteur celebration, and large ones were held in Chicago by both the American Chemical Society and the American Medical Association.

Sometime afterwards the idea of having a bust of Pasteur at the American Institute took firm hold in my mind. I was visiting in Denmark and went to call on our guest of honor, at the Carlsberg laboratories. When passing through the gate of the Carlsberg brewery I paused a moment to gaze at the bust of Pasteur, which was placed in its present position by Mr. Carl Jacobsen. It was then that I conceived the idea of securing a replica of the bust for the American Institute of Baking; I recalled my conversation with Mr. Russell, and his idea that all of us owed the debt to Pasteur of spreading to the public at large a more complete knowledge of the value of his services to mankind.

I communicated the idea to the sons of Carl Jacobsen, Mr. Helge Jacobsen, director of the Carlsberg Glyptotek and Mr. Vagn Jacobsen, one of the directors of the Carlsberg Brewery, both formerly students of the Wahl-Henius Institute.

They received the suggestion with enthusiasm. Later they were joined by Mr. Poul C. Poulsen, also a former student of the Wahl-Henius Institute, and now managing director of the Carlsberg brewery. However the obtaining of permission to

reproduce the bust was by no means as easy a thing as it had appeared at first. No other replica had ever been made of the bust, and in order to obtain the proper authorizations it was necessary to consult both the Pasteur and the Dubois families. In France the copyright on works of art rests with the artist, always, and is not transferred, as in this country, to the purchaser of any example of the artist's work.

When it was explained to the Pasteur family and the artist's family that it was intended to present the bust as a gift to a scientific institute in America, permission was readily granted. The bust was cast in the same foundry, with the same scrupulous care, that had characterized the casting of the original.

I conveyed this news to Dr. H. E. Barnard, director of the American Institute of Baking, who was delighted at the prospect, and stated in reply that everything would be done by the Institute to make the ceremony of unveiling a memorable affair.

On a subsequent trip to Denmark I requested Professor Sorensen to deliver the oration on Pasteur's life at the unveiling of the bust. This he promised to do. Prof. Sorensen is considered the latest link in the shining chain of Danish scientists, and I take this occasion to name a few of them.

Their number includes Tyche Brahe, the famous astronomer, Ole Roemer, discoverer of the velocity of light, Hans Christian Oersted, discoverer of electro-magnetism, Steno, father of modern geology, Finsen, discoverer of the beneficial application of light in therapeutics, Emil Christian Hansen, discoverer of pure culture yeast, and Neils Bohr, the great physicist.

And so it has come to pass that this wonderful bust of Pasteur, the great French scientist, was presented by Danes, former students of the Wahl-Henius Institute, to the American Institute of Baking. Thus Denmark and

America join in paying tribute to the great humanitarian, Pasteur.

In addition to the bust itself the donors have presented us with a beautiful deed of gift, which I will read to you. This scroll is in itself a piece of art. At the top appears a picture of the Carlsberg laboratories, done in Pastel shades, the script being hand engraved, and the whole highly illuminated. It is signed by Helge and Vagn Jacobsen and Poul C. Polsen.

On behalf of the donors I feel greatly honored in having the privilege of now unveiling the bust.

Dr. Henius drew back the folds of the American flag from the bronze bust, while a stringed orchestra rendered the Star Spangled Banner, with the audience joining in the words.

President Stritzinger Accepts

DR. HENIUS, Honored Guests, Mr. Chairman, Ladies and Gentlemen:

This is indeed a unique occasion. It is a striking demonstration of the amity of three great nations and the internationality and close relationship of art, science and commerce. Nowhere in the panorama of the ages do we find a parallel to the spectacle of a beautiful work of art being presented by Danish scientists in memory of a French savant to an institution maintained through the vision of a branch of American industry. Further than that, this day marks an epoch in the history of the manufacture of bread.

Geologists, historians and biblical students agree as to the antiquity of what has been called an art since time immemorial. Its commercial practice dates from the establishment of a public bakery in Rome immediately after the Macedonian subjugation. But, it remained for the present generation of bakers to recognize

the necessity of science to any real progress. The American Bakers Association is just celebrating its twenty-sixth birthday and the American Institute of Baking is the result of the vision of a few worthy pioneers in what was purely a commercial organization not unlike the ancient guilds.

When the Association was first organized, three short years after the death of Louis Pasteur, there was a vague recognition of the fact that something was lacking in the industry. What it might be was known to none. In fact, the mere suggestion that science was a reasonable handmaiden of the craft brought down a shower of abuse and ridicule that was only equalled by the similar attacks on the original of this bust when he first expounded the theories which are now recognized as facts. The baker smugly folded his hands and laughed at the idea of receiving information from outside the craft.

The public, skeptical as ever, held up its hands in holy horror while science wrapped its skirts about itself as if to avoid contaminating contact with so menial a craft. But in this sterile mass known as the baking industry was found a living organism not unlike the cell which Pasteur proved to be responsible for fermentation.

Young men, the sons of bakers, began to come from our universities with the question, why is science not as essential to breadmaking as it is to other activities? Gradually their question began to make itself felt until progressive individuals began to establish laboratories and research fellowships for the studying of the many problems that presented themselves from day to day. Still the results of such work remained the property of the sponsors until suddenly the same spirit that must have actuated the work of Pasteur broke forth in the hearts of the

leaders of American Bakers Association. As a result we are standing today in the halls of an American Institute of Baking.

This institute is well fitted to stand as a shrine for the bust of a great public benefactor. Established and supported by men whose normal instincts are commercial it is none the less built about an ideal—that of public service. Its findings are the property of the world and not of the men who contribute to its support. Its sole purpose is the betterment of the service which a great industry is rendering to a great people.

And yet, something was missing. The baking world had recognized the importance of science but the scientific world was not yet ready to accept the hand of fellowship. It remained for the Jacobsen Brothers in the year nineteen hundred and twenty-four to fill our cup to overflowing. We feel that this unveiling is like the awarding of an emblem of membership in an organization which combines privilege and honor with the responsibility of that breadth of vision which denies selfishness.

Dr. Henius, I accept, in the name of the American Institute of Baking, this splendid bronze tribute to a man, who, though born under the Tricolor of France, is today universally claimed as a citizen of the world. We ask you to accept our most sincere thanks for the gracious manner in which you have made the presentation, and we ask you to extend to the donors our assurance of grateful appreciation. We feel that, rather than an accolade for past achievement, this presentation is a graceful challenge and a perpetual reminder to the baking industry of the United States to strive sincerely in emulation of Louis Pasteur, that great man who gave his life for the betterment of mankind.

Dr. Barnard's Introduction

In introducing Dr. Sorensen, Dr. Barnard said:

The Carlsberg Laboratories have from their inception taken an important part in the scientific world. Their directors have been leaders in their fields of effort. In them Emil Christian Hansen as head of the biological department following the earlier work of Pasteur, developed pure yeast cultures. Jessen-Hansen there under the direction of Dr. S. P. L. Sorensen, did his fundamental work in Hydrogen ion concentration.

The present director of the Carlsberg Laboratories is Dr. S. P. L. Sorensen. Dr. Sorensen studied at the University of Copenhagen and received the gold medals of the University in 1889 and in 1895. He was chemist of Denmark's geographical exploration in 1890-93 and assistant in the chemical laboratory of the Polytechnic School, 1892-1901. Since 1901 he has been Director of the Chemical Division of the Carlsberg Laboratories. He received the Oersted medal in 1909, was made an Honorary member of the Chemical Society of London in 1920, of the Société Chimique de France in 1921, of the American Chemical Society at its meeting in Ithaca this past week. Dr. Sorensen was Chairman of the Pasteur Association in 1922.

Dr. Sorensen's work has been closely associated with biological chemistry. He is noted for exactness in analytical methods, and his studies on enzymes, amino acids and proteins and the determination and significance of the hydrogen ion concentration in biological chemistry. Because of his high position in the scientific world; because of his valued contributions to the chemistry of the fermentation industries and because of his intimate knowledge of the work of Pasteur and his appreciation of his service to science, as

well as because of his long friendship for Dr. Henius, our erstwhile host, it is peculiarly fitting that he today honors us by his address, "Louis Pasteur."

Oven vs Flame Made Toast

I AM writing to congratulate the Institute on your experiments with carbonized, or burned-black toast versus golden brown or caramelized toast. I read of the work of Dr. Rumsey with these toast types with great interest because for eight years I have served a golden brown, caramelized toast made with all three of the type of modern fires; namely—gas fire, electricity, and coal. I found that the only way to produce with such fuels an ideal piece of toast was to employ the use of the oven, a thing which most hotel chefs detest. While they have been spoiling toast by applying the flames direct for a "flash" toast I have been employing a thin bake pan or sheet that will hold about 8 or 10 slices of toast. I have found it unnecessary to turn the toast when I have used one of the oven shelves on the bottom of the oven. I have found I could keep four pans going nicely. In a gas oven I have regulated the fire to toast properly a layer of toast on the center shelf. In most hotels the oven is called for roasts long before breakfast orders cease coming in. Before I would give up my oven for toast I would buy a little range of my own just for toast service. Many chefs have called me a fanatic, but your experiments have exactly confirmed my practice of years. In several places where I have worked the toast we served has been a topic of every-day conversation among our guests. I am not working as a chef now, but if I should return to that occupation I would serve oven toast every morning and I know that those eating it would be back next morning for more.

—John R. Yates, Kansas City, Mo.

Humanity's Great Benefactor

How He Grew to be the Father of Modern Medicine and Baking and Many Other Branches of Science and Industry

By S. P. L. SORENSEN *

THE great French chemist, Ad Wurtz, in his well-known "Dictionary of Chemistry," published in 1869, prefaces in this manner, "Chemistry is a French science. It was created by Lavoisier."

The German author, Hermann Kopp, in his book "The Development of Modern Chemistry," published four years later, has expended more than fifty pages to prove that Wurtz's claim is not in accordance with reality.

Kopp's meaning is, that chemical science has existed before Lavoisier's time, but that the latter has effected a radical reform therein.

There is certainly no doubt that Kopp is right, but there is just as little doubt that Kopp entirely lacks presupposition in order to understand Wurtz's proud sentence. Lavoisier, "The Father of Chemistry," who during the French Revolution suffered death at the guillotine, has indeed not created Chemistry, but he has revolutionized its principles, and he has established the foundation upon which modern chemistry is built.

If I should say to you today, "Microbiology is a French science. It was created by Pasteur," then neither would that be in accordance with the truth, but Pasteur has revolutionized microbiology. His life's work has been the basis for the whole of modern bacteriology and microbiology.

These sciences' gigantic edifice rests on that firm foundation Pasteur has created—in a domain, where everything before then, was unstable and baseless, and as

far as these sciences and their practical application extends—from medicine, veterinary science, antiseptics, and hygiene to agriculture, dairy-farming and every kind of fermentation industry—so far has Pasteur's work left its mark on our daily life.

Louis Pasteur was born on the 27th of December, 1822, in the little town of Dole in the east of France, but the family removed a couple of years later to Arbois where Pasteur had his childhood home, and to which during his whole life, he was greatly attached.

His father—like his grandfather and great grandfather before him—was a tanner, and had taken part in the Napoleonic wars as a member of the valiant 3rd Regiment, called "brave among the brave."

Pasteur's mother was lively and of an easily animated disposition, while his father was of a reserved and somewhat melancholy nature.

Little Louis had a gift for drawing, and at one time there was talk of him being an artist, which his father was quite averse to. Otherwise Louis was not an ordinary "clever boy;" as his biographer Vallery Radot says, his childhood might be compared to the almost hidden source of a mighty river.

Pasteur was trained as a chemist, and among his teachers and patrons, Dumas, Balard and Biot can bear special mention. His first task was therefore of a purely chemical nature, in that his "Doctor" dissertation dealt with the subject of arsenic. By far the most important of Pasteur's purely chemical or physico-chemical work

* In an address at the unveiling of the bust of Louis Pasteur at our Institute.

is his famous separation of racemic tartaric acid in its two optically active forms. This work, published in 1848, when Pasteur was only 26 years old, has been of the greatest significance for the development of organic chemistry. I will not go further into the matter, except to mention that young Pasteur himself felt that his observations were just as significant as they were surprising for he asked his old friend Biot if he could do the experiments over again for him. It is well known how Biot doubted his young colleague, how he himself supplied the necessary chemical preparations, how he himself did the most of the work according to Pasteur's directions, and how he at the finish when the experiments proved the correctness of Pasteur's statements, folded him in his arms exclaiming, "My dear boy, I have loved science so much during my life, that this touches my very heart."

Strassburg Days

In the year 1849, Pasteur became Professor of chemistry at Strassburg, where he won his bride, Maria Laurent, a daughter of the Rector of the University. They were married the same year, and Madame Pasteur throughout life, was not alone a most devoted wife but also her husband's faithful friend and co-worker.

Pasteur continued his studies of tartaric acids in Strassburg thereby taking up the action of the organism of fermentation on these substances.

It was a happy chance, one might say, that caused Pasteur to give his mind to these studies which formed a link between chemistry and microbiology.

It was also a happy chance, that already in 1854, Pasteur was transferred to Lille as Professor of Chemistry, and Dean of the New Faculty of Science for thereby he came to live in one of the centers of the fermentation industry in France; and

finally it was a happy chance, when in 1856 a Lille vinegar manufacturer, instigated by his son who was inspired by Pasteur's lectures, applied to Pasteur for advice concerning serious difficulties in the manufacturing of the vinegar. Pasteur obligingly complied, took up the task, and thus began the investigations which led to a complete revolution in microbiology and in the application of this science.

The fermentation industries' position was not an enviable one at this time. One had only experience and tradition to go by from the one generation to the other, but no one had any comprehension of what happened during the fermentation. The fixed methods of working, generally gave the required results, but suddenly there might occur the most peculiar irregularities, which quite changed the character of the fermentation, and occasioned great loss.

The Liebig View

The fermenting industry could not expect help from science, as the ruling theory—first and foremost defended by Liebig—held that the chemical actions taking place during fermentation and allied changes can be explained "in terms of molecular physics" alone, and without yeast's "direct co-operation." In close connection herewith rested the past's whole view on the question of "generativ aequivoce," the question of how far living bodies, or in a narrower sense, how far yeast or bacteria could generate of themselves.

When it is known, that by grape-must or beer wort's fermentation, by the souring of milk or the putrefaction of food stuffs, that a great number of microbes make their appearance, while it is not usual or possible to identify them in fresh bodies, it can be assumed that they generate "of themselves."

It became one of Pasteur's great and imperishable merits to show that all the micro-organisms which are the cause of fermentation, putrefaction and a great number of diseases which we now call "infectious diseases" are to be found in the air, in the ground, in the water and so on, shortly speaking, in the outside world surrounding us.

They can therefore force themselves in everywhere, and under favourable conditions for their development unfold that—for them—characteristic action.

Ferments and Sterilization

On the other hand, if such micro-organisms are kept out, nothing happens, must does not ferment, milk does not turn sour, meat does not putrefy, because microbes cannot generate "of themselves." Fermentation, decomposition, putrefaction, all are "acts of life," and in the absence of life do not take place. A liquid really sterile, will remain sterile forever, and in that condition, will neither ferment nor putrefy. Germs are not exempted from general law of life; they cannot come into the world without germs, without parents like themselves.

Pasteur's many and troublesome tasks in this domain were carried out partly in Lille and partly in Paris, to where he was transferred, already in 1857. Pasteur's views met with violent opposition, and gave rise to excited debates in the French Academy, particularly in the Academy of Medicine. It seemed to many of the old doctors, in fact, to be bordering on sacrilege, that a chemist, and not a medical man should be teaching them the origin of disease. It was namely at a very early stage, about 1860, that Pasteur was fully aware that it would be exceedingly desirable to make use of the experience he had reaped by the study of the fermentation organism, in order to

make the origin of the different infections evident.

Pasteur gradually overcame all opposition. He disarmed every objection by fresh experiments, which were carried out under the control of a commission appointed by the French Academy. Besides, which was more important than all, it came to pass, that his theories could be carried out in practice.

He taught men of the fermentation industry that when the fermentation of vinegar, wine, beer, alcohol, etc., went wrong, it was because the fermentation was "unclean," viz., that foreign ferments or bacteria, or briefly speaking, foreign micro-organisms had forced their way into the fermenting liquid, and these foreign organisms developed the "disease" in vinegar, wine, etc., which the manufacturers had to fight against. He further showed them how these diseases could be guarded against by keeping out the injurious foreign organisms as far as possible, and if they had got in, how they could be made harmless, killed by heating, through that process which in our time still bears the name "pasteurization."

Medical Opposition

It was therefore very natural that when the silk crop in France threatened to be disastrous on account of the steadily increasing attacks of silk worm disease that Pasteur was applied to for help. This was in the year 1865, and Pasteur took up the question at once and with it Pasteur came to the last, and indeed, the most significant stage of his life's work, the pathological researches.

From 1865 to 1869, Pasteur was grappling with this problem; it was complicated by the fact that there were two diseases (pebrine and flachery) to investigate, and was rendered difficult by the hostility or scepticism of the very people

whom his discoveries would benefit. Pasteur identified the two diseases, proved them to be contagious as well as hereditary and he showed how to detect and stamp them out. Even in March, 1869, the silk trade was still only half convinced of the absolute value of Pasteur's results. "They are absolute," he insisted, and to prove his point he sent to the sceptical Lyons silk commission four lots of seeds. "Lot 1 is healthy," he said, "and will succeed; lot 2 will die of pebrine only; lot 3 will die of flachery only, and out of lot 4 some will develop pebrine and some flachery," and everything he predicted came to pass. "That is," says one of his biographers, "the story of how the silk trade was saved by an 'unpractical' man of science."

I will only add that this involved a considerable sum of money, as the disease in the course of a few years had reduced the proceeds of the silk crop from 100 million francs to less than 10 millions, and as it was in France, so it was in other silk producing countries.

Believed in Industry

As you have already seen, it was a characteristic of Pasteur's research, that he, with imposing ease and ingenuity, so adapted his great scientific discoveries that they could be made use of in practical life. He was the ideal representative for co-operation between science and practice. We have seen that his purely scientific, chemical and biological investigations with regard to fermentation and diseases of the silkworm gave the most important results to practical industry.

As we now shall see again, Pasteur, with the same peculiar ability was able to investigate the infectious diseases of animals and the microbes which were the cause of the diseases and to make use of these investigations to combat them. His research in this went on without inter-

mission, and in the space of a few years (1880-1883), communications were issued through Pasteur regarding methods for battling against three widely-spread and considerable diseases as chicken-cholera, anthrax or splenic fever; and red sickness—a contagious disease of the pig.

These discoveries aroused the greatest sensation everywhere, not only in scientific circles, but in the minds of the public, as many hoped that it would be possible to combat human diseases in the same way. The hope was not put to shame, for in 1884, at an international congress of doctors held in Copenhagen, Pasteur produced results which substantiated the possibility of an effectual treatment of one of humanity's most dreaded diseases, namely, hydrophobia.

Winning the Medical Men

All modern vaccine and serum treatment of a number of infectious diseases among human beings and animals is in reality a direct consequence of Pasteur's work, which opened the way.

We will refer a little closer to Pasteur's examination of anthrax and hydrophobia.

The anthrax or splenic fever is a terrible disease of sheep and of cattle, which at that time—it was in the year 1877—was destroying 5 per cent of the cattle and 10 per cent of the sheep in France. The principle, which Pasteur applied to combat this, and the other mentioned infectious diseases, was similar to that already previously applied by Jenner against small-pox. Just as Jenner, by the inoculation of cow-pox, rendered a person proof against the actual small-pox, so would Pasteur make an animal proof against a really severe attack of the disease, by inoculation of contagious matter which was weakened in some way, and which only developed such a mild form of the illness that it presented no danger.

In this, Pasteur was successful in the highest degree.

To begin with, he conducted a number of splendid investigations as a decisive evidence that the cause of anthrax disease was the stave-formed bacteria, bacillus anthracis, also observed by former scientists.

Pasteur followed this up by showing that with the help of heat, by cultivating this microbe some few degrees above the temperature of the blood, a weakening of the anthrax culture could be attained, a weakening, the process of which one could follow by inoculating animals of different size, white mice, guinea-pigs and rabbits.

While on unenfeebled culture by inoculation under the skin had a deadly effect on all the three classes of animals, a culture held at a temperature of 42°-43° C, would gradually lose its virulence and thus its deadly capacity, first on the rabbits, next on the guinea-pigs, and lastly with a sufficiently long enfeebleness, on the mice.

With such an enfeebled culture, Pasteur vaccinated sheep and cattle against anthrax, and it was well-known how with an experiment planned on a large scale in 1881, he swept away all doubt as to the correctness of his views.

On a farm close to Melun there were collected altogether 58 sheep, 2 goats, and 10 horned cattle. The experiment began on the 5th of May, 1881. Half of the animals were inoculated with a greatly weakened anthrax culture, while the other half which should serve as means of control, were not inoculated. Twelve days later on May 17, the vaccinated animals were inoculated afresh, but this time with a somewhat less weakened culture than the first. This finished the vaccination, and a fortnight later, on May 31st, its effect was tested, in that all the animals, vac-

inated and unvaccinated, were inoculated with a fresh strong poisonous culture of anthrax bacilla. Some days must pass before the disease broke out, and the experiment was followed with thrilling interest, both by Pasteur's partisans and opponents. Already on June 2nd, Pasteur could show the result of the experiment, before the large interested circle that had streamed to the trial-farm, and this result left nothing to be desired in the way of plainness. All the vaccinated animals were perfectly healthy, without a sign of disease; the unvaccinated sheep and goats were all dead except 3, which died in the course of the day; the unvaccinated cows were certainly not dead, but they were all very ill, very feverish, and were very much swollen.

I shall not dwell on the immense significance in pure economical respects effected by Pasteur's anthrax vaccination investigations. I shall only mention an enlightening fact, that according to the statistics taken at the beginning of that century up to the year 1900, over 11 million animals were vaccinated.

Battling Hydrophobia

Pasteur's best known and most conspicuous research is his battling against rabies or hydrophobia. It will be impossible here to go into details concerning these experiments which were begun in 1880 and which were of a particularly difficult nature, because Pasteur did not succeed, and neither has any one else succeeded, in isolating the micro-organisms that have a bearing on this case. The experiments were still made more difficult by the long incubation of the disease, as several weeks passed by from the point of time a person or a dog was bitten till the sickness broke out, and lastly the extraordinary large mortality from the disease. In spite of all difficulties, however, Pasteur succeeded in finding a mode

of proceeding by help of which he could make a dog proof against the disease, yes, also prevent the sickness from breaking out even if the treatment had first been begun after the dog in question had been bitten by a mad one.

Pasteur, however, was fearful of applying his results on a human being, even if he felt ever so safe in his treatment of dogs. "I take two dogs," he wrote in September, 1884, "I have them bitten by a mad dog. I vaccinate the one and I leave the other without treatment. The latter dies of rabies, the former withstands it, but however, I should multiply my cases of protection of dogs, I think that my hand will shake when I have to go on to man."

Pasteur's anxious pondering came to an abrupt end when on the 6th of July, 1885, a mother with her 9 year old son, Joseph Meister, put in an appearance at the laboratory. The boy had been bitten two days previously by a rabid dog, and the mother begged Pasteur to save the child's life. After most serious consideration, Pasteur complied, and his anxiety and uneasiness heightened from day to day, according as the vaccine employed became stronger and stronger, but all went well, and this first human case was a complete success. Shortly after, a young shepherd, Yupillo, was treated. He had rescued some children from a mad dog, and had been himself badly bitten before managing to kill it. To make matters worse, he arrived in Paris six days after the attack; yet inoculation saved him also.

The news of the successful treatment of these two cases rang through the world, and in the next six months 350 patients were treated. The only failure was a little girl, Louise Pelletier, who was brought for treatment thirty-seven days after being bitten. In March, 1886, nine-

teen Russians, badly torn and mutilated by a mad wolf, were brought by their doctor to Paris. The bite of a mad wolf is even more deadly than that of a mad dog, and it was fifteen days since the wounds had been inflicted. It was almost certainly too late, but Pasteur could not deny these forlorn fellow-creatures even the faint hope of life that his treatment offered. Of the number, only three died—a really surprising result, considering the conditions.

Conviction of the value of inoculation against rabies grew steadily in the minds of unprejudiced doctors and men of science, and a commission appointed by the Academy of Science, unanimously voted that subscriptions should be asked for in France and abroad to found a "Pasteur Institute" in Paris for the preventive treatment of hydrophobia.

It is well known what a success this subscription was, and it is equally well known how the "Pasteur Institute," opened in Paris in 1888, was followed by the establishment of similar institutes round about in the world, which have continued Pasteur's fight against diseases of widely different natures, and which have been a blessing to mankind.

A World's Man

Pasteur was a marked man himself when he moved into the large new institute which bears his name, and he was never able to take an active part in the new laboratory. Already in 1868, he had a serious apoplectic stroke, which after-effect never left him. He never gave up, however, but continued his beneficial work as long as he could, with the usual "Pasteur" energy and sense of duty. In this respect it is characteristic of Pasteur's view of his work for the welfare of humanity, that, when a colleague once spoke to him of the danger connected with some investigations he carried out

during an epidemic of cholera, and exclaimed "Courage is needed for this sort of work," Pasteur's simple answer was "and the sense of duty."

On September 28th, 1895, Pasteur passed peacefully away. He rests in a crypt under Pasteur Institute's main building, above the entrance of which is written in gold the few words "Here reposes Pasteur."

In conclusion, if we should ask, what to our knowledge, gives Pasteur's name such a special lustre, I do not think we would give most preference to the great discoverer who has paved new roads in science. Neither do I think we would give our attention to the exceedingly great practical significance Pasteur's work has had for industrial life. I think that, which would be first and last with us, would be the rich and warm humanity in the whole of Pasteur's blessed realm of his life's work.

As humanity's great benefactor will Pasteur's name be preserved throughout ages. It will be able like a standard emblem to gather together all races and all classes to peaceful co-operation for the good of humanity.

Let then this bust of Louis Pasteur we unveil today, be as a symbol, that also this branch of the fermentation industry, housed within these walls, is built on the foundation Pasteur has created. Let it stand as a symbol that the work here done is in the same spirit as Pasteur's, and in reverence to his memory.

Guilty Without Trial

FOR the last two years or more the American millers have been endeavoring to increase the consumption of bread. During that time enough schemes and slogans have perished to fill a trade grave-

yard of unfulfilled hopes. Toast was ultimately regarded as the most likely means of popularising bread, but little is heard of that nowadays. It really seems that the publicity campaign has been an abject failure, and the end of all the efforts amounts to a confession that trade is a trifle worse rather than better than before. The bakers, of course, catch it "in the neck," to speak in the vernacular. The Federal Commission quotes prices to show that the decline in wheat prices so disastrous to the farmers, has benefited the purchaser of bread very little. The milling companies, whose profits have been fairly well maintained notwithstanding excess capacity, observe in this statement the key to the whole situation. Bread prices have not decreased in like degree with the prices of wheat and flour. The bakers have not been asked to give any explanation. They are simply found guilty. All else having failed, and somebody having to be blamed, the bakers are made the target for the "slings and arrows of outrageous fortune." So we find that human nature is much the same the world over.

—The British Baker.

To An Indiana Baker

I am inclosing herewith scores of two loaves of bread received from you yesterday for scoring and comment by this department. We are very glad to report that these loaves received an unusually high score, and I wish to congratulate you on the quality of bread you are putting out, not only because of the satisfaction it must give your own customers but because such excellent bread always makes it easier for bakers' bread in general to find a ready acceptance in the home, the restaurant and the dining car.

—O. W. Hall,

Technical and Service Department,
American Institute of Baking.

Cerelose in the Bakery

Report on the Investigation of this Product in our Laboratories

THE commercial preparation and the composition of Cerelose have been previously discussed in Baking Technology. Analyses of Cerelose made in our laboratory have indicated that this product is a highly purified dextrose. It is free from dextrans and unfermentable matter, with a true dextrose purity of over 99.5%, on the dry basis.

Check analyses made periodically on samples taken from shipments of Cerelose received at the Institute have shown that uniformity of composition is well maintained, and that it possesses good "stability," or keeping quality on storage. The details of these experiments will be reported later.

The use of Cerelose in bread formulas is of important interest to the baker from several practical aspects, among which are its effects on fermentation, the quality of the resulting bread, and its relative cost in comparison with other fermentable sugars.

The nutritional aspects of the use of Cerelose in connection with the bread problem present no difficulties. Dextrose, of which Cerelose is composed, is the most widely distributed sugar found in nature. It occurs naturally in most fruit and vegetable juices and also as a constituent of other, but more complex sugars, such as sucrose, maltose, and lactose. All these three sugars yield dextrose on digestion in the body. The maltose produced from the digestive enzymes on starch is finally broken down to dextrose and absorbed. probably over one-half of the energy of the usual diet is ultimately derived from dextrose.

It is of interest to note in passing that we have observed no differences in the

effect on the growth of experimental animals when fed on milk bread made with Cerelose in comparison with milk bread containing cane sugar.

The general use of relatively high amounts of fermentable sugar in American bread formulas is striking, in comparison with the usual practice of Great Britain and Continental Europe where little or no sugar is employed. In this country the amount of cane sugar or sucrose added directly to the dough batch appears to range from 1 to about 5%, the amount of sugar contributed by sweetened condensed milk varies within a similar range, and the reducing sugars from malt extracts and syrups from 0.15% to 2.0% on the basis of the flour taken as 100%. The general average for cane sugar appears to be about 3%.

The sugar requirements of a dough batch depend upon a number of conditions such as the original diastatic activity of the flour, the amount of yeast, the temperature and time of fermentation, the temperature and time of the proof, temperature of the oven, and time of baking, and obviously whether the dough is a straight or a sponge.

The amount of Cerelose used in various bread formulas in the Institute bakery under the direction of William Walmsley has varied from 2.5 to 3.0%, the amount varying in proportion to the amount of sugar carried by other dough ingredients such as sweetened condensed milk and malt extracts and syrups. The usual amounts of Cerelose which appear to be suitable for white bread formulas is from 3.0 to 3.5%.

Numerous experiments with Cerelose carried on in the Institute bakery have

failed to show any practical differences in the rate of fermentation of straight doughs prepared with Cerelese in comparison with doughs containing cane sugar under the same conditions.

Gas evolution tests with Cerelese after the Hayduck method, conducted in our laboratory have not shown appreciable differences in the rate of gas evolved, or in the total volume of the gas measured at the end of two hours. These experiments will be discussed in detail in a future report.

The characteristics of the bread baked from white bread formulas containing Cerelese has been the subject of considerable study here especially in relation to the color of crust. The ideal crust color is a matter of opinion among practical bakers and at present there is no satisfactory method for describing crust color except in descriptive terms or in the arbitrary values of a scoring system. The American Institute of Baking has adopted 8 as the numerical value for crust color, or 8% on the total score of 100 points. 30 points or 30% are considered the perfect score for the external appearance of the loaf. If the crust color scored 8 on the basis of 30, this would be equivalent to 26.67% of the total value or external appearance.

Bread made with 3.0 to 3.5% of Cerelese has been scored repeatedly by a number of observers independently in comparison with bread made with cane sugar in various formulas from representative commercial brands of flour used in the Institute bakery.

The results of these experiments have not shown appreciable differences in the color of the crust, produced by the two sugars under comparable formulas, mixing, fermentation and baking conditions.

The influence of sugars on the production of a satisfactory crust color and

bloom has been somewhat overemphasized by popular writers on baking, with the results that there is considerable confusion as to the relative importance of the other factors involved.

There is little experimental data on the subject, and for this reason we are conducting a study of some of the factors which appear to be of significance. The results of this investigation will be the subject of a future paper.

C. B. Morison,

Research Department, American Institute
of Baking.

Civilization in Business

CIVILIZATION in its truest sense, merely means cooperation. There is no civilization where there is only one person, because there can be no cooperation, can be no established order of mutual help and interdependence.

Civilization began when men began to cooperate with each other, living in tribes, instead of alone, in order to better cope with their common enemies. Civilization will cease when men no longer live close together, observing certain customs for the common good and enjoying certain protections; likewise contributing certain substance and effort to the maintenance of the social structure.

Civilization in business began when men first began to confer with others of their own particular occupation, began combining their forces, cooperating to solve the problems which were the lot of every one and of all as a whole. Civilization in business has now reached its highest development in the form of Trade Associations.

—From a broadside inviting Potomac States bakers to attend the Virginia beach convention.

A Song of Pasteur

WILL the stern scientists, who know how Superstition had to bow to the Microscope, and how Pasteur's use of this enlarger of the Infinitely Small, put out of commission the Aristotelian philosophies, a whole category of "miracles," and the bulk of mankind's blind fear of disease, be shocked to find that Pasteur was honored by brewers in a drinking song before ever the rest of the world had discovered him?

Therefore the following brewmaster's lyric has a place in life that may long outlive the science of brewing itself. It was sung at their annual picnic parties and at banquets. It carries the title: "Song of the Microscope," and traces the steps in the discovery and use of this instrument, from Zach Janssen's experiments in Holland, through Lieuwenboek's discovery of yeast cells, to Pasteur's discovery of what they mean and what other microscopic organisms might be associated with them. Then the song proceeds:

A hundred years, and at last we know
How the yeast can ferment and grow;
And the name of the brainy man:
Caginarde de la Tour and Schwann!
Still we often would have malheur
If it were not for the great Pasteur,
Who told us 'bout the beer disease,
Bacteria—if you please.
Don't mind them, you'll find them
If you pin your hope on the microscope;
Don't mind them, you'll find them,
And worry you shall nevermore.
When the bacteria were exiled
Hansen looked—and the yeast got wild.
Mycoderma and Pastoriane
"This won't do, we must make it sure!"
So he started a culture pure,
Single cell—as you know so well
—And now if your beer gets hell,
Don't mind it, you'll find it,
If you pin your hope on the microscope
Don't mind it, you'll find it,
—And worry you shall nevermore.

A curious thing about this song is that bakers might sing it as to rope and mold, dairymen might sing it by substituting the story of souring milk, raisin men by making the tale fit spoiling raisins, apple growers by fitting in spoiled apples, poultrymen by making it the song of the long-kept egg, silk producers by making it the song of the flatchery disease, and surgeons by making it the song of the plagues, of typhoid, of infection in every one of its manifestations.

Home-made Weather

Schert's bakery in New Orleans now displays the large sign: "Cake Bakery." It has an alluring assortment of sweet goods and cakes but for bread it sells a product made in a controlled plant, where the modern science of baking is fully recognized and conformed to.

As he explained the case to an Institute visitor, "The big bread factory of to-day makes its own weather inside the plant and weather has a great deal to do with yeast action. I have a better assortment of cakes and sweet goods for giving that field my undivided interest than I would have if I gave bread half my time and cakes the rest. So that this arrangement pays me very well."

The experiment is interesting. It may grow—or remain localized. In the north it has as yet made but few signs of headway.

We wish to assure you that we bakers here in Australia greatly appreciate the work of American bakers that is done through their Institute. We are endeavoring to copy some of your activities, but as yet we are a long ways behind. Some day we expect to get a little nearer up.

—J. Dempsey,
Secretary Master Bakers' Association of
Queensland, New Zealand.

Towards a Complete Food

A Report on Experiments With Common Food Ingredients

By ROSCOE H. SHAW

Department of Nutrition, American Institute of Baking

IN PREVIOUS papers we have discussed tests with white rats fed on apples, potatoes, spinach, butter, cabbage, rice, etc., as compared with water bread and milk bread and have shown that while water bread does not contain all the requirements of a complete food, neither do other common articles of food and that when milk becomes the sole liquid constituent of bread it enters the class of those few foods that, when eaten by themselves, most nearly satisfy the body requirements. In this paper we will discuss the results of feeding tests with baked beans, eggs, and milk as compared with water and milk breads.

In the other papers we told of the purposes of these simple feeding tests but in order to avoid misunderstanding it seems best to repeat. Not long ago a report appeared elsewhere showing that when white rats were fed water bread as their sole food, they not only failed to grow to any considerable extent but were short-lived. Through a misunderstanding this report did a very considerable amount of harm to the baking industry. Some of those who read it or heard of it did not appreciate the fact that the bread fed to the rats was water bread and that milk did not enter its makeup. To them bread was bread regardless of its composition. They also failed to consider the fact that bread is rarely if ever eaten alone. Bread made with water is fast disappearing from the American market, being rapidly displaced by bread in which milk plays an increasingly important part. Few indeed of our single articles of food are complete in themselves, but when eaten in conjunc-

tion with other foods the proper balance is secured and the nutritive requirements of the body are met.

Every one of the six articles of food discussed in the previous papers is an important part of our diet but not one of these when eaten alone will promote growth or even sustain life for any considerable period. This is just as true of bread when made without milk. Water bread, although, as has been shown by others as well as ourselves, not a complete food, is one of the most valuable articles of diet we have when eaten in conjunction with certain other foods. When milk becomes a part of the composition a great improvement takes place in the nutritive value of the loaf, and when it entirely replaces the water the bread then becomes very nearly a complete food.

So our purpose in conducting these simple feeding tests was to show the baker, and consumer as well, how baker's bread compares, from a nutritive standpoint, with some of the other common articles of food and to furnish the baker some facts he could use in meeting adverse criticism. These tests do not bring out anything particularly new and nothing in these papers should be construed as reflecting in any way upon the articles of food discussed.

Eggs and Milk

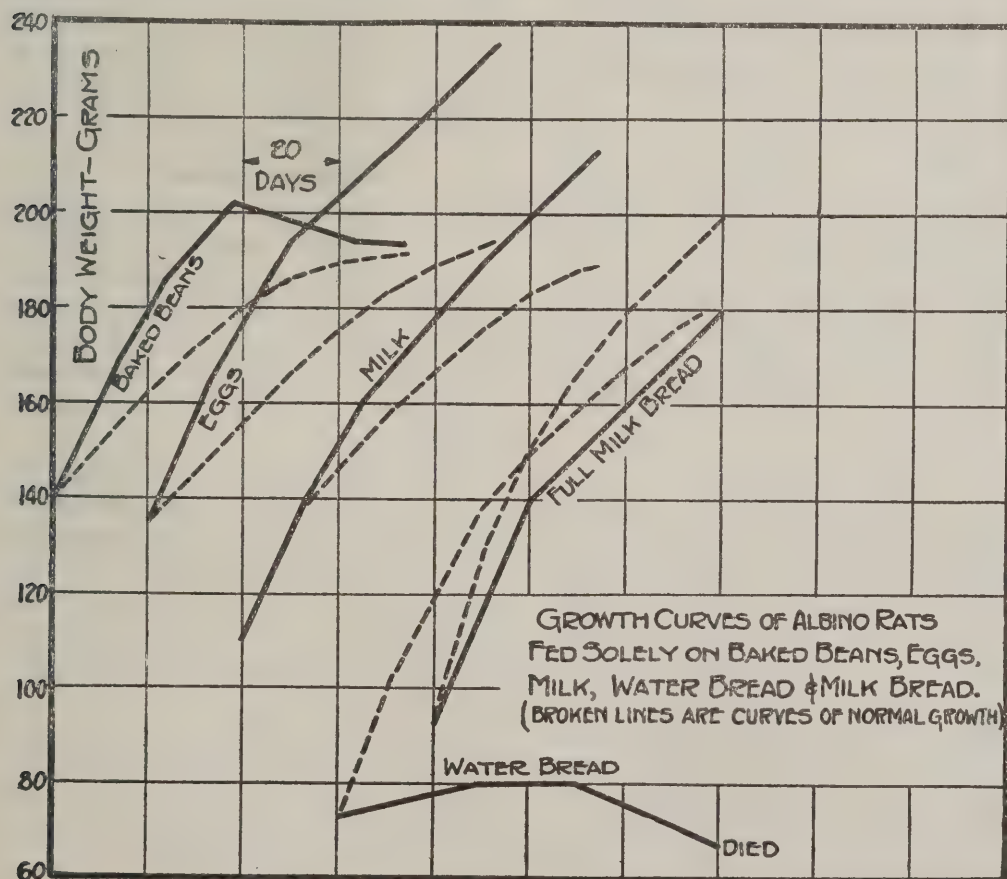
We need not speak of the nutritive value of eggs and milk in this paper for it is too well-known. Eggs are nature's food for the embryonic bird while milk in the same way is the food for the young of all mammals in their early growing

period. These two stand at the very head of the list and in a way must serve as standards for all foods. Baked beans, on the other hand, are popularly supposed to be best adapted for men at hard labor. They have been the chief article of food in lumber camps, on ships and in the army for long periods.

As brought out in the previous papers the feeding tests were conducted in the usual manner. Young rats were selected in their vigorous growing period. With the exception of water they received nothing during the test except the particular food being studied. They were kept in individual cages and under close observation. At frequent intervals they were weighed and from these weights the accompanying chart was prepared. The

eggs were hard-boiled, each rat receiving half an egg as his daily ration. The milk was pasteurized milk purchased from a milkman delivering in the neighborhood of the Institute. The baked beans used were of the canned variety, without ketchup but with the usual addition of pork; this pork, however, was not fed to the rats. The bread used in the test was made in the bake shop of the Institute from standard formulas. The water bread, of course, contained no milk, while the milk bread contained sufficient powdered whole milk to make it equivalent to bread in which the entire liquid ingredient is whole milk. The bread was sliced, air dried, and ground in a mill.

In the accompanying chart the heavy line represents the growth of a representa-



tive rat from each group: the broken lines are curves of normal growth showing how the rat should grow when he receives a food complete in all essentials. It might be remarked here that the normal growth curves are made from the average weight of thousands of rats.

Better Than the Average

It will be noted on the chart that the rats fed eggs and milk grew in a normal manner, in fact, they grew faster than the average rat on a complete diet. The rat receiving baked beans also grew quite as fast as did the others up to a certain point, then there is a lag in his growth curve. At the end of the experiment, however, although he had ceased to grow as before, his weight was still above normal. This group of rats will be continued on their diet for a time longer and the results will be reported in connection with a nutritional study of sandwiches now in progress at the Institute.

The rat fed water bread gained but little and was short-lived. The great improvement in the nutrition value of bread when milk is used is very strikingly shown in the growth curve of the rat receiving milk bread. His curve quite closely parallels the normal growth curve, though it is on the under side rather than above as in the cases of the rats fed on milk and eggs.

The Human Reaction

The question may arise as to whether or not the child would grow in the same way as the white rat if fed on the same sort of food. Generally speaking it has been found that all the higher animals, including man, react toward food in essentially the same way. The metabolic processes of the smaller animals are so much like ours that their food requirements, except in quantity differ in no material way from ours. Eggs were not designed by nature as a food for white

rats, yet they contain the food essentials, properly balanced, so that their nutritive requirements were fulfilled. In the same way, of course, baked beans are not the natural food for white rats, yet they contain the proper proteins, carbohydrates, fats, mineral matter and vitamins that the rats need for growth and well-being. Likewise milk bread contains in a very large measure at least the same essentials, and the rats that received it were able to obtain what they needed to live and grow.

It is hoped that the simple feeding tests reported in this series of papers will be helpful to the baker and bread consumer by showing how bread compares from the standpoint of nutrition, with some of the other every day articles of food. Even the much maligned water bread takes on a different light when compared in a feeding test with potatoes, apples, cabbage, rice, etc., and full milk bread enters a class not far behind the most complete foods known to man.

What to Know

WHEN a few far seeing bakers decided that their industry needed an Institute to stand at its frontier, as a contact point with the world at large, they foresaw that many hundreds of inquiries, then having no focal point, would be consolidated and answered in a way to build esteem for the industry.

It has worked out just as its forecriers said it would for the daily stream of visitors at the Institute includes magazine writers, editors, scientists, men of allied interests who wish to learn how their products may serve the baking industry best, and teachers from scores of institutions.

One of these institutions is the University of Chicago. Miss Evelyn G. Halliday brought one class through—and a few months later asked permission to bring another class through.

But this time she knew definitely what she wished her class members to hear.

"Won't you have one of your instructors," she wrote to Dr. Barnard, "tell my class what is the optimum amount of salt to use in a bread mix and what the penalty is for departing from this optimum amount? And can't you have your Mr. Hall score a loaf of bread for us in his laboratory? We heard him before and would like to learn more about the points that makes a loaf of bread good or bad.

"There are ever some many research problems we should like to learn about. As for instance, what work is being done to improve flours because of the poor quality of gluten although plenty of gluten may be present. We should like to hear of some of the work on the addition of salts and acids.

"Bread fermentation temperatures interest us and we should like to hear what is the optimum temperature for the initial and also for the final rising period, and how this optimum temperature varies, if it does, with the humidity. We should like to know how much of a variation from the the optimum may occur before the quality of the bread is affected. And we are interested in work to discourage the growth of undesirable organisms.

In your town, Mr. Baker, wherever you are, there are women interested in Home Economics. Have you invited them to your bakery yet? If not, nothing would pay you so much as to do so. If you have not done so because your bakery is not just ship shape, nothing would pay you so much as to make it all that you would like to have it become before welcoming the visiting inquirer.

Then when they come, the interests voiced above may give you the key on what to talk to them about. The most staunch devotees of bakery service are

the women who know enough about bread to know that it is no mere mechanical process that can be attempted in the home with impunity and in ignorance of the complicated bacteriological and chemical processes involved. These women know why, when they baked at home, they only had "luck" every once in a while, and so they know why they cannot duplicate the expensive protections afforded in the modern plant to the loaf while it is fermenting and being baked.

The Modern Loaf

PETER G. PIRRIE, Technical Director of the Advance Milling Co., lately received from an "old timer," as he called himself, a criticism of modern bread and a loaf of his own manufacture for comparison. The modern loaf, the old timer said, is too rich and sweet; too much like cake, and it lacks the oldtime flavor.

There is no arguing about tastes, according to the ancient proverb; but Mr. Pirrie's opinion about the old timer's loaf was not very flattering. He found the loaf small in volume, open and dark grained, sour in flavor, and poor in appearance. And he added that while a loaf from a long-time sponge may keep its moisture longer, he has never seen such a loaf that would compare in quality with the average loaf of modern times. Most people who remember the old time baker's loaf, which is still, unfortunately, manufactured in too large a measure, will agree with Mr. Pirrie's verdict. Old time millers who remember the flour that most bakers used to buy, will supply one reason why the bread was so poor and failed to compete with the home loaf. The old time baker wanted it chiefly as a sort of wrapping paper for the air and water in his bread.

—The American Miller.

Witch's Bread and Whalers'

*How One Resulted in Making Thirteen the Baker's Dozen
and the Other Kept New England's Ships Afloat*

By MAYOR WALTER H. REMINGTON*

Of New Bedford, Massachusetts' Famous Whaling Port

BAKERMEN of America, did you ever learn how Thirteen came to be the "Baker's Dozen?" Witchery had something to do with it, and Mayor Remington of New Bedford, a town so near to Salem, Mass., that it ought to know all about witches if anybody does, herein sets down the authentic facts.

And did you ever know how the ship's biscuit that kept the sailormen of whaling days contented enough to sing their chanteys while making sail, was in turn laid down for them? No, the sailors did not knead it with their feet, although base and unverified rumors to that effect got afloat among unvarnished sailormen, who had not consulted the literature, and had not researched among source documents of New Bedford's hey-day period. Mayor Remington knows the facts about that and here records them.

A short time ago, out of curiosity, I looked up something about a former New Bedford industry which has long since disappeared. This was the baking of ship bread—and when the whaling industry was at its height, about seventy years ago, a large part of the bread which was served to the sailors on their long voyages came out of New Bedford ovens.

The regulation ship bread of the palmy days of whaling was a hard baked cracker made of flour and water only. It did not even contain salt. All the salt that was necessary for the sailors' meal was furnished by the salt beef with which the whaling vessels were outfitted. When the

bread was done, and packed in the clean casks which were stored into the whaler's hold, it was as hard as a rock, and good to last for four or five years at least. In those days a whaling voyage was something more than a summer sail. A cabin boy who shipped as a tender youth with his mother's consent oftentimes came back a full bearded boat steerer after a cruise which had taken him into the seven seas and to the uttermost parts of the earth.

Several barrels of flour were emptied into a trough and water enough poured in to make a very stiff paste. It was then kneaded with the hands until it would just hold together. Sometimes a board was placed on it, on which the workmen jumped. From this action the story has come down that ship's bread was kneaded with the feet, but this, I am assured, was not so. Hand kneading was very hard on the wrists, and the bakers were obliged to wear flannel bands about their wrists to keep them from swelling.

When the dough had been sufficiently kneaded it was put upon the "brake," a table fitted with two rollers, and not unlike the modern clothes wringer. After the dough had been passed through these rollers, it was rolled up and broken off in chunks and moulded into the required form.

When they were eaten, these biscuits had to be softened by soaking in tea or coffee, or water, which ever was served. One of the favorite methods was to add them to boiled salt beef, cut into small pieces, the pot liquor doing the softening, and the flavor being given by the addition

*In an address to the New England Bakers' Association.

of an onion. This mess was known as "Lobscouse," and was a standard on shipboard.

The ovens in which the ship's bread and crackers of those days were baked were huge affairs of brick, with tiled floors, heated like an old Dutch oven. Full length pine sticks, or perhaps hard wood fagots, were piled in and allowed to burn until the bricks had absorbed a large amount of heat, when the embers were cleaned out and the tiles swabbed off with a damp mop made of netting called "scuffle." This left the oven with hardly a trace of smut. If, when the bread was removed from the oven there chanced to be any smut remaining on it, it was cleaned off by being rubbed across a board filled with stiff bristles held across a boy's knees.

Twice Around the Earth—Then Eaten

To those of you who are accustomed to modern ovens, with temperature controls and all sorts of convenient doo-dads to insure a satisfactory product, the method of the old New Bedford ship bread baker must seem crude. But the bread baked in those old New Bedford ovens sometimes circled the earth two or three times before it was eaten, and when it was finally disposed of, it was eaten with a relish promoted by the hardest kind of hard work, together with the knowledge that it was that or nothing.

Witches and Thirteen

Now, to change the subject slightly. I suppose all old bakers know where the term, "a baker's dozen," comes from. But it is likely that some of your younger ones do not, so I will set down the story as it was given to me.

A Dutchman named Jan Pietersen kept a bake shop in Amsterdam in the year 1654. Good churchman though he was, the bane of his life was the fear of being bewitched, and to keep out evil spirits

he primed himself with an extra glass of good spirits on New Year's Eve. His sales had been brisk, and as he sat in his shop meditating on the gains he would make on the morrow he was startled by a sharp rap, and an ugly old woman entered his shop.

"Give me a dozen New Year's cookies," she cried in a shrill voice.

"You needn't speak so loud," remonstrated Jan. "I ain't deaf."

"Give me a dozen," demanded the woman; "here are only twelve."

"Well," said Jan, "twelve is a dozen."

"One more," insisted the woman, "I want a dozen."

"Well then, if you want another, go to the devil and get it," was the reply.

The hag took Jan at his word; at least she left the shop. From that time, it seemed that the baker was bewitched. His cakes were stolen; his bread was so light it went up the chimney or so heavy it fell through the oven; his wife became deaf; his children went wild and his trade went elsewhere. Three times the old woman returned to his shop, and each time, after he had sent her again to the devil, things grew worse.

At last, in despair, the baker called upon St. Nicholas to help him. In a moment the venerable patron of Dutch feasts sat before him, advising the trembling man to be more generous in the future. After a lecture on charity, the good saint vanished, and the old woman appeared in his place. She repeated her demand for one more cake and Pietersen gave it, whereupon she exclaimed, "The spell is broken; from this time on a dozen is thirteen." Then, taking from the counter a gingerbread effigy of St. Nicholas, she made the astonished Dutchman lay his hand on it and swear to give more liberal measure.

Since that time, thirteen has been called a "baker's dozen."

Books for the Baking Laboratory

CANCER. *How It Is Caused; How It Can Be Prevented.* By J. Ellis Barker, M. P. Dutton & Co., New York.

It is a singular thing that the least informed writers are often the most entertaining. They are so unhampered by facts that their diction flows freely where authorities hesitate for fear of using a word unsupported by definite proof. The finest example of this dangerous art which has appeared since Jules Verne wrote is "Cancer," the pseudo scientific treatise on one of the most serious and least understood maladies of mankind, written by J. Ellis Barker, not a physician or surgeon, but as he himself points out, an "amateur." But while Jules Verne told of things on the surface of the moon and made no pretense of writing facts, Barker, with the authoritative pose most easily assumed by the ignorant, says, "Every statement of mine is borne out by an overwhelming mass of evidence." And to prove his statements he uses scissors and paste pot to patch together the most amazing mass of misinformation about cancer that has ever been printed outside the Sunday supplements.

"Cancer," he says, "is due to chronic poisoning and to vitamine starvation," and he blames the "wretched food chemists" for "teaching the medical profession that the value of foodstuffs consisted solely in the proteins, fats and carbohydrates contained in them." The author, although talking blithely of vitamins, overlooks the facts that our knowledge of vitamins is largely that given us by chemists. And he ransacks the food literature of twenty years ago to support his statement that the food supply is poisoned with preservatives, bleached with chemicals and dyed with arsenicals. "American families," he says, "often live entirely on food bought ready-to-eat, on factory prepared food, on vitamineless and chemically doped food." With the characteristic abandon of a member of the Society Opposed to Prohibition he blithely asserts that "ten times as many people may die in the United States from sugar poisoning as died from alcoholic poisoning before 1917." Bakers will be interested in the statement that the "milling interest buys up all the wheat, grinds off all the outside and hands over the dead, vitamineless flour to the wholesalers who 'bleach it and add to it various chemicals which are supposed to facilitate baking, to improve the appearance of the loaf or to make a bigger loaf, to the great injury to the com-

munity which is forced to buy a deceptive article which is attractive to the eye but which is made unwholesome and dangerous to health."

Frederick Accum, who, back in the 18th century, wrote his classic, "Death in the Pot," and who referred to the bread in his day as a crutch to bear us onward to the grave," instead of the "staff of life," may well rise from his mouldy grave to greet his brother author, and with crossed fingers salute the latest exponent of the doctrine that it doesn't matter what you say, so long as you say it entertainingly.

It is unfortunate, however, that such a book as "Cancer" is available to the thousands of hypochondriacs who, like the author, imagine themselves to be in an "advanced pre-cancerous condition." It will be doubly unfortunate if his readers place any credence in the statement that "the great majority is forced to live on devitalized, doped, embalmed and mummified food," and driven to desperation, return to the habits of our cave-dwelling ancestors and their diet of roots and raw meat. And Barker would even take away the meat.

"Cancer" is a book for the strong-minded—or for those who are so unbalanced by paresis that hobgoblins are regular friends.

H. E. B.

THE TECHNICAL CONTROL OF DAIRY PRODUCTS. By Mojonner & Troy. 947 pages, 192 illustrations. Mojonner Brothers Company, Chicago, Ill. Price \$10.

We would expect this book, coming from the pens of two such well-known men as Timothy Mojonner and H. C. Troy, to be exactly what it is, a valuable contribution to the Dairy Industry or to those having to do with the testing of any of the dairy products.

Mr. Mojonner is president of the Mojonner Brothers Company Milk Engineers and also consulting chemist for the dairy industries. Before the founding of the Mojonner Brothers Company he had much experience in chemical control work.

Prof. Troy is in charge of testing in the Department of Dairy Industry at Cornell University and has had years of experience in teaching and research work.

The book is thoroughly up to date, well bound, and the illustrations are good. It is designed for chemists and plant operators as well as for teachers and students. The first chapter deals with the

arrangements of the Dairy Plant Laboratory. This is followed by a chapter on the general chemistry of milk. Then there is a short discussion on the history and principles of some of the well-known tests used for dairy products, and then come many chapters devoted to chemical control work in the plant. Among the chapter headings are—Preliminary Instructions for Making Fat Tests; Care and Use of the Balance, etc.; Sampling Dairy Products; Preservatives, Care, Preparation, Testing, etc.; General Information on the Standardizing of Dairy Products, etc.; Standardizing Whole Milk and Cream, etc. Two chapters are devoted to ice cream, including a detailed discussion of overrun. There is a chapter on Bacteriological tests giving complete instructions for carrying on such work with dairy products. Another chapter deals with the analysis and miscellaneous tests of dairy products including the determination of the Hydrogen-ion Concentration. The subject of evaporated milk is well covered in another chapter. An appendix gives numerous conversion tables etc., arranged in a very convenient form.

This book should be in every dairy laboratory and in every baker's laboratory as well if tests of dairy products are made.

R. H. Shaw.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Potency of commercial vitamin preparations.

E. M. Bailey, H. C. Cannon and H. J. Fisher. Rep. Conn. Agr. Expt. Sta., Bull. 240 (1922).—Of the common vitamin preparations tested 40 were useless, 25 inferior, 20 equal and 15% superior to dried brewer's yeast of good quality in their vitamin potency when fed to white rats. Partial analyses revealed fillers and various drugs in some of them.

A. L. Mehring.

Net energy conception. E. B. Forbes. Science 59, 350-1 (1924).—This conception affords a discriminating method for determining and expressing important differences in feeds which are not revealed by other systems of feed comparison. It recognizes the final energy value of the protein of the feed, the liquid and solid wastes and also the wastes in the gaseous form and as heat, the different nutritive cost of different kinds of production, distinguishes between the net portion which is useful and the large fraction which is useless in feeds, and is scientifically significant

in being expressed in the varying terms of physical measurement. Like any general measure of nutritive value, net energy is essentially a conception of convenience, and not an abs. standard, since it must ignore the finer points of specific effects of foods. The American Society Animal Production indorses the conception of net energy values derived from Armsby's researches with the respiration calorimeter.

L. W. Riggs.

Characterization of rye and wheat flours through examination of water extracts. R. Strohecker.

Z. Nahr. Genussm. 47, 90-7 (1924).—Various kinds and grades of flours were studied by the following method: To 5 g. portions of sample add 50 cc. H₂O and make to a thin paste. After standing 15 minutes, filter through a folded filter prepared so that exactly an hour is required for the solution to pass. Det. on the filtrate (1) H₂O—solution substances by evaporating 10 cc., (2) n_D²⁰, by the Zeiss dipping refractometer, and (3) sp. cond. at 18°. Calculations are made on the H₂O free basis. The amount of H₂O—sol. substance and the conditions vary with the grade (degree of refinement) of the flour while n does not; for this reason the latter is considered a more useful const. for determining rye-wheat mixtures. The refractometer reading of exts. from 41 samples of rye flour varied from 22.15 to 24.46 and from 22 samples of wheat flour from 18.75 to 20.96. Sp. cond. of the former 9.94-14.33×10⁻⁴ and the latter 5.63-10.24×10⁻⁴; % H₂O—sol. substance in the former was 11.80-17.08 and in the latter 3.83-8.58. Sp. cond. particularly was shown to vary with the grade—the more highly refined, the lower the cond. It is suggested that this take the place of the regular ash detn. as a measure of grade. From results obtained in applying the const. to other flours it was concluded that sp. cond. can be used to distinguish between barley and wheat, also oats and rye; H₂O—sol. substance and n for potato starch flour and wheat or rye; all 3 const. for potato flour and wheat or rye, etc. Numerous results are given for various mixts., the microscope being used as an aid.

Frank E. Rice.

The value of bread as a food. F. H. Lorentz. Umschau 28, 189-91 (1924). The importance of bread not only as a source of carbohydrate, but also of protein, ash constituents and vitamins is discussed.

H. J. Deuel, Jr.

Building Up Bread and Toast

ONE baker who called to express words of wisdom to an Institute staff member thought all efforts to increase the use of bread in the diet would fail because "bread's share of the ration was fixed ages ago and can't be changed."

Orange men once thought that as to oranges—now they market twelve times the number they did when that was the settled gospel of the industry.

Milk men once thought it as to milk. They removed the bugaboo of uncleanness; now they sell four or five times as much as they formerly could and have developed scores of new ways to use it.

What shall bread men and rolls men say to the vendors of sandwiches and rolls, with meat fillers, when these people try to market their goods without a touch of appetizing butter? Here is what Ida Bailey Allen, noted food authority, has to say about a way she conceives bread and rolls can be sold in greater sandwich volume.

"Now that summer is coming on, the sale of sandwiches should be very greatly increased and I believe that you can put out a campaign on this one subject to restaurants, lunch rooms, etc., that will help you tremendously.

"The reason more sandwiches are not eaten is because the bread is not buttered or the filling is not sufficiently moist.

"To-day Miss Wilbur and I lunched at one of the biggest New York restaurants. We paid 85 cents for a sandwich of tongue and Roquefort cheese and 50 cents for a sandwich of Swiss cheese and ham. The bread in both cases was guiltless of butter. No butter is used in the railroad sandwiches. This makes the sandwich awfully dry.

"If you will get out a folder showing

how they can make a little butter go a long way or suggest some moist fillings or the mixing of mayonaise or Russian dressing with the sandwich filling or the spreading of it on the bread instead of butter, so the sandwiches will be moist, I believe you can do a great deal for the baking industry.

This idea is one of the soundest brought to the Institute by well-wishing friends. Needless to say, the idea advanced will be put into action.

Milk—and Bread

In Worcester, Massachusetts, all good housewives received during a September week a rather unique label on their milk bottles. It was golden brown, like a good loaf of bread, in color, and was in the shape of a loaf of bread. The label read:

"Toast with Milk, The Ideal Health Food. Wheat in the form of toasted bread is nature's most valuable health aid and when served with milk it is the ideal food combination. **Eat plenty of toast and milk and your health will take care of itself.**"

This fine statement of food facts was distributed and paid for by P. J. Blanchard, dealer in pure milk and cream, at 78 May Street, Worcester.

From the Northwestern Miller we constantly learn of the amazing advance in scientific milling and baking in America. I am very anxious to study the literature that tells of this advance, as I am chemist of one of our biggest mills in Holland. Can you please send me a list of research publications on American milling, cereal and baking progress.

—H. J. Meerhamp van Emden,
Chemical Engineer at the Stoommeel-
fabriehn, Holland.

BAKING TECHNOLOGY

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A Glance Ahead to January

FOR all bakers who have traded to machinery the labor tasks of their plants, and have hired production managers to take care of their machines, this article is a call to service. Such bakers are now ready to look ahead ahead to the next great task in front of them. It is to align their plants with their communities, to see that people think as well of them and the bread that they produce, as their bread deserves. This task calls for consolidation of interests, a pooling of all known knowledge, and a concentrated effort to develop all possible new knowledge in this field.

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Ideals must be made practicable, data studied with a view of making it fit into the needs of each individual plant, and all progressive bakers in all progressive cities must be "sold" on the idea that winning respect jointly for their joint product is a worthwhile enterprise.

Therefore it is time for each baker so situated that he desires to take part in a National movement to nationalize good will towards the baker's

product, and to educate the public as to modern methods and modern results, to begin to think of that problem. The individual thinking will run together this Fall and in January it will find expres-

sion in a conference called by our Board of Governors.

You can get in touch with your nearest Governor now and begin to tell him your ideas. Those present at the January conference cannot know too much of the problem that will then confront them.

It is the problem of making a Trade Promotion Service a definite part of the activities of the American Institute of Baking, with the staff to carry on this special work and a method of making its discoveries and views available to the entire industry.

This is merely a shooting forward of one line of growth sketched in preliminary fashion at the Atlantic City convention. There, in informal talks consuming four hours or more, a group of nearly 100 men interested in the task of telling the baker's story, sketched out the rough outlines of the Activity That Is to Be.

What it all amounts to may be well told in the terms of the experience of Alton G. Hathaway in New England. He found, as a baker, that the consolidated raisin growers were putting a national pressure behind baked goods containing the raisins grown by these co-operating farmers. He found he could tap this national pressure by inserting his own advertisements in New England papers, right alongside of or directly underneath the advertisements of the co-operators of California.

Did it pay? He found that he could add \$50 worth of local pressure to \$500 worth of national pressure applied on behalf of raisin baked goods in general, and thus could focus all of this general interest directly upon Hathaway's raisin products right in the communities where his potential buyers lay.

Why should not every baker in the land do that with the big national campaigns that associated industries are carrying on?

All that is essential is a central co-ordinating group such as can be organized at

the American Institute, to distribute to all locally advertising bakers the news of what national campaigns are under way, and what mediums will be used and just when. Every baker can then plan his local campaign so that it will just add one more drum or one more trumpet to the national orchestration.

This has been talked of informally for years. It has been tried spasmodically. Now the January approaches in which this old-time vision of Al Taggart and Elmer Cline can become part of the organized working system of America's bakeries.

Elmer Cline's View

Something of the plan it is now proposed to reduce to organized shape in harness for action, was cast out as bread upon the waters of the baking world in these words of Elmer Cline:

The biggest universities are no longer content to train men merely to be lawyers, doctors, engineers, and teachers. They see the need to train men for business. Studying the problems of business calls for studying the problem of marketing. Our American Institute is leading other industries in many fields. It can house a department to study, intensively, the task of increasing bread markets. It can approach that problem in the same intensive manner in which it has approached the scientific side of bread production. That is why a conference is needed in January to put this new work upon its feet.

Others than Mr. Cline felt the same way about it. It is appreciated that the co-operative effort needed to launch and finance such a movement will be something very different from the co-operation which was defined by a famous railroad magnate as "doing what I want, and doing it damn quick."

Our Diminishing Sales

Here is a view of the problem as ex-

pressed by Bayard Venerable, one of America's veterans at developing selling methods:

You have in the baking industry a basic industry. Without your industry human life cannot survive. In proportion as human life advances the science of food must advance. We must face the fact that out of better human conditions, out of shorter hours of labor, grows a condition in which less energy producing food is required. Yours, therefore, is a diminishing market. And in this market there exists a phenomenal problem of distribution. To solve it you have got to step out and find where your business lies.

You have got to know these facts with the same scientific precision and accuracy that you know the scientific facts of your fermentation process. There is nothing more subtle than the human mind and soul and that you must ever keep in mind as you work with this problem. **We are coming to know that the man who holds the key to the factory holds nothing that cannot be taken away, but that the man who holds the key to your market holds the key to your prosperity.**

You have tremendous advantages in this marvelous association you bakers have built up. You have equipment and men and money. You can therefore gird yourselves to a still more important campaign than any you have so far carried out. It is the campaign to win and hold the key to your markets—to your prosperity.

You must realize that the independent campaigns you can now synchronize and harmonize and consolidate are but the beginning of the foundations you must lay. Your organization must be expended to figure marketing with scientific accuracy.

You find the rootlets stretching out in many allied fields. The grocer has his hand out to the baker, seeking a joint means of building a better industrial

structure. The vocational education of to-day is more important than the professional. You find what this means when you see so many associations seeking to conquer their respective industries in the marketing sense as well as in the production sense. Therefore I urge that you put into the hands of your Governors a mandate to make a conclusive study of markets so that your future will indeed be glorious for you.

Consolidating Campaigns

And in this mandate what is to be done with the advertising that is not lived up to by the goods? Here is the Sunmaid Raisin Company filling the bill boards and windows with attractive pictures of appetizing raisin loaves. The raisins protrude and challenge attention. What then is to be said of the baker who bakes a loaf with only an occasional raisin in it—a loaf that belies the poster? No advertising man who has yet spoken has defended such a baker. All have held him to be his own worst enemy who carries down to disaster with him not only his own enterprise but a national enterprise as well. As Kenneth Barnard of the Associated Advertising Clubs of America held the picture up to the baking industry: such conduct in the light of the advertising behind it means that you have not solved your problem and that your money and your effort are only going down the sewer.

Mr. Carl Corby of Washington, D. C., is one of those who will take much interest in the January conference. And as he puts it, the baking industry does not want to go on with haphazard methods comparable to trying to sell a gold watch to a condemned man about to be hanged, or trying to sell a coffee grinder to a one armed man. The disappearance of all such methods is one end the KNOW YOUR MARKETS movement seeks to bring about.

At Trent Hall

TRENT HALL is, so far, only a site on a beautiful carpet of green grass. But the vision to build it has been seen by the Canadian bakers, and checks are being written, as these words go down upon paper, that will cover the cost of its erection.

Trent Hall is going to be part of the Canadian Agricultural College at Guelph, Canada. The will to erect it grows out of the fact that the Canadian government is "sold" on the idea that there is a science of bread baking, as well as the ancient craft, and that the Government wishes to teach this science to its young men in so far as they may care for vocational training in this particular field.

When Trent Hall is erected by bakers' money, and money raised within associated industries, it will house a School of Baking. But at this School there will be no high fees. For a merely nominal sum government-paid instructors will teach the science of baking, including the bacteriology and the chemistry associated with it. The government has already found its faculty members—except for a practical baker to take charge of the shop, and it has already graduated two classes of ten men each in a baking course that carries the student through the production of bread on a one-loaf basis.

There is some romance connected with this growth of the slender rootlets in Canada of the idea that the baking industry should have its center of scientific training. It starts, perhaps, half a century ago when H. E. Trent became secretary of the Canadian Bakers Association, or rather became informally their friend and urger towards organization. It was forty-two years ago that he took hold, formally, of their organization at its birth and he has been thinking of its problems ever since.

For years he urged that the bakers found a school. Then came the days of activity on this side of the border. The American Institute threw open its doors and within a few months Mr. Trent was knocking for admittance.

With him came a score of Canadian bakers. They looked over the plant—and every point about the American Institute became a talking point for a similar activity in Canada. But some feared there would be a duplication of overhead and equipment. The American Institute was seen to fill up to its full capacity—and over.

"Now is the time for a Canadian school," became the slogan. The last convention in Canada was styled the "School at Guelph" convention. Oddly enough, the government of Canada took hold even more eagerly than the bakers themselves.

The government's agricultural college at Guelph had a chemical building and a bacteriological building. Adjoining the latter was space for a Baking Hall. The beautiful play field of the campus stretched off to the west when Mr. Trent led a special train of Canadian bakers to Guelph to see the site.

On the campus, as the bakers stood on the site offered free by the government, they could see young men at play on the track, in football squads, in rugby squads,—and everything about the place breathed a welcome to devotees of vocational training and the Science of Baking.

Bakers found it impossible to hold back their money. Some who had hesitated for years sent in large checks. And they formed committees—one to equip the school, one to shape its courses so that it will aim its graduates directly at the shop problems they will confront after they graduate. Thus the plan for a "School at Guelph" went over the top.

The Canadian bakers now plan a national convention at Guelph. They plan to hold it on the college campus,—and possibly within their own building,—their own scientific home for their industry.

England itself is moving in the same direction. They have drawn up a plan for a national home, based primarily on scientific research and a school for their young men. Both plans should work out before many moons. And when they do, the huskies of the American Institute will perhaps have a challenge in reserve for an international meet for the Doughchute championship at anything from chess to football, not to mention cricket and croquet.

A Bakers' Club?

HAS your city formed its bakers' club? Chicago did it in September when the "Dough" club was launched amid much good fellowship. Louisville, Ky., did it in October when the leading bakers laid aside all their differences in order to gather around a common board to advance the interests of their industry.

Do such clubs work? The makers of closed-model automobiles held a show together and flooded the papers with advertisements just singing the glories of the closed-body model. The result was that many more people visited the show than ever could have been lured there by any one motor company working alone. All together they sold the public on the closed type of car. Then each fought for his share of the newly created business. Without that preliminary co-operation there would have been comparatively little business to scramble for, as bakers who have lived apart from one another under feud conditions, have learned to their sorrow.

Whole Wheat Again

The records of the Scottish Wholesale Co-operative Baking Society, by much the largest bakers in Scotland, which cater particularly to wage earners, show that they distribute 97.6 per cent of white bread and 2.4 per cent of brown to their members generally, but, taking the mining districts by themselves the proportion of white bread is 99 and brown bread 1. Instinct is doubtless a safer guide here than theory, and people will continue to eat what they like. Brown bread is neither a panacea nor a poison and even a dog knows when to eat grass.

—Andrew Law in the London Times.

Grocery Aid

Grocers receive a fine assist in recent poster advertising of the Livingston Baking Co. The posters are to be stuck on grocery windows, and besides advertising Livingston's bread for picnic sandwiches the posters call the attention of picnickers to the fact that the grocer also carries deviled ham, American cheese, special corned beef, creamery butter, dill pickles, mayonnaise dressing, prepared mustard, boiled ham, waxed paper, and picnic sets of paper plates and napkins.

The Baker's Task

When one bakery opens up near another already established, the task of each is to join his baker comrade in proving to the people of the community that the best and most economical place for baking is in an establishment devoted exclusively to this work. Bakers should get as far away as possible from the thought of working to take business away from other bakers. That spirit seems rather foolish when as much baking as all bakers do together is still fair game.

—Bakers' Helper.

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

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OCTOBER 15, 1924

We Work Together

To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.

To Our Membership

WE cannot look backward and still move forward but I want to pay my respects at this time to Past President Stritzinger and his work just finished by saying the industry has advanced. And when we remember that this same industry ranks seventh in size in this country, then only do we appreciate what he has been able to accomplish.

Your new officers are keenly appreciative of the responsibility they have assumed and will simply try and keep our industry steady, balanced and advancing each day so that the bakers may have more light in solving their problems.

This can only be accomplished by teamwork on the part of the officers and governors (and this is assured) and the support of every individual, firm and corporation of bakers together with their allied brothers.

If we can but arouse the bakers to the possibilities of the work now going on in Chicago and enable them to view our new work, not as a labor of man, but as a devel-

opment of the very soul of their business, then we have begun to succeed.

Let us not wrap our cloak snugly about us and feel that we do not need this kind of growth but let us begin to see that we have, right within our own grasp, an ideal that is trying to grow.

When science reaches out its arms from abroad to help shed this light, let us understand its real meaning of importance to ourselves and get behind the work now being done at Chicago and make this year not a bigger and better one for ourselves individually, but a glowing tribute to our vision of the future.

LEWIS F. BOLSER,
President.

The Next Step

TO many men of many minds the Atlantic City convention appealed in diverse ways. The scientist was glad to find that Prof. S. P. L. Sorensen had been doing at the Carlsberg laboratories just what American scientists had been accomplishing at our own Institute, so that his report checked our own.

The sales manager found in the conference conducted by Elmer Cline of Indianapolis a home for his interests in salesmanship, and was glad that he could participate in the forming of a permanent organization to solidify knowledge about bakery merchandising.

The production manager saw in the work of Richard Wahl and his conference on bakery engineering a gesture in the direction he has to go to reach the full power of his position as a man responsible for bakery production. Just so the secretaries of state and local group associations found a little corner of the convention week apportioned off to themselves in the conference called by J. H. Woolridge, of Washington, D. C.

Each of these groups worked towards permanent organizations within the larger

marshaling of the baking industry. But to the particular convention participant who writes these words, the feature of most outstanding interest was the presence at our convention of F. Woodey Hockaday, of Wichita, Kansas. Hockaday is not a baker, nor a wheat grower. He is a fore-crier—working for Kansas and Kansas wheat growers. He came unheralded and went away unsung, but he brought with him banners proclaiming the need of the farmers to sell wheat,—to sell it in the form it is eaten, as baked goods.

He saw that the baker manufactures bread at enormous cost for industrial overheads, out of the farmer's wheat, so he came with no chip on his shoulder. He wanted co-operation—co-operation between farmer and baker. And that was something new. This team have been apart long enough. Hockaday departed with a determination to teach the farmers the baker view-point. That in itself will be an achievement.

A Business Temple

ONE of the most beautiful buildings in the world is the new home where the newly organized business interests of the United States may have their voice heard in National affairs. This is the home of the Newer Capitalism of Service. Merle Thorpe preaches its gospel every month in its magazine, "The Nation's Business." This new home has been erected by the U. S. Chamber of Commerce.

Science has done much for the baking industry. The U. S. Chamber of Commerce can do more. As seventh American industry in importance, we can much more effectively crowd forward towards sixth place, if every baker is in touch with the activities of the Chamber of Commerce of his own city. One day a full flowering of the contact now possible will occur, and the new Washington home of Business will then know our industry as a welcome member of its family.

A Needed Leaven

A BAKER who baked out three doughs each morning, laid enough yeast for all three beside his mixer. He mixed the doughs, each in its turn, and then noted that the yeast action on the last batch was much more feeble than on the first.

He promptly telephoned the yeast company that it had sent him bad yeast, demanded a replacement, and refused to buy any more yeast from the "offending company."

The baker had never learned the nature of yeast, which is as much a plant as the wheat in the field, and seeks to grow whenever the temperature is favorable. If he had known that he himself ruined the yeast by leaving it lie for hours in a warm place, he hardly would have blamed the company, but rather would have kept all except enough for the current batch in refrigeration where the cold would keep the yeast cells numb and in reserve. That's what "in cold storage" means. As well blame the soda fountain clerk because your ice cream cone has melted an hour after being put aside in a hot room as blame a yeast company when yeast weakens in a warm mixing room.

Get Out the Vote

WHAT group of people in America comes so close to the masses as the bakers who pass out over the counter, or deliver through wagon routes, the people's daily bread? There is a duty every American owes to his own citizenship. It is to vote, for without the votes of our fathers there would now be no free institutions for our generation to enjoy. Each baker can urge upon his neighbors and his customers that they remember the need to exercise their prerogatives of citizenship by casting a ballot on election day. A national non-partisan organization backs up this move to "get out the vote."

Science's Bakery Invasion

It Occurred Comparatively Late Among the Fermentation Industries

By S. P. L. SORENSEN*

Director, Department of Chemistry, the Carlsberg Laboratories

Dr. Sorensen's message to American bakers concerning hydrogen ion concentration in dough batches, comes from the head of the chemical division of the most interesting laboratories in the world. They may be said to be the inspiration of all modern university laboratories for they were the first to be built to give an outlet to the revolutionary discoveries of Louis Pasteur. Before even Pasteur's French associates saw the need for the Pasteur Institute in Paris Captain Jacobsen in Copenhagen saw such a need and built the Carlsberg Laboratories in Pasteur's honor. There Dr. Sorensen works, and carries on just as our research chemists at the American Institute do, in laboratories built in part by a disciple of the scientists at Carlsberg,—Max Henius. This address, joining Carlsberg research with ours is epoch-making in the advance of baking science.

BAKERY has been the last branch of the fermentation industry to institute a rational and systematic, scientific study of the materials used in its work, and the processes which take place in the preparation of those materials: the flour, the dough and the bread itself.

I do not mean to say that no labor or attention has been devoted to, say, flour investigation: it will be quite sufficient here to mention the name of your countryman, Thomas B. Osborne, and his pioneer work in connection with the vegetable proteins, including those of wheat and rye. What I mean is that such work was formerly carried out without that close association and intimate cooperation with the working industry, which are essential if the industry itself is to profit fully by the results obtained. And on the other hand, such cooperation is of the greatest importance to science. The scientist, one might say, is constantly being spurred on by the questions put to him by the masters of industry, which force him to look

further into old problems, and present him with some new ones now and then.

The importance of this cooperation, in the bakery business as well as others, has, during the last ten years or so, become more keenly appreciated throughout the world, not least in America. I will not here refer to individual investigators; I must, however, mention the steady and purposeful work which has already been carried out for some years at "The Minnesota Agricultural Experiment Station," and the work commenced both at the "American Institute of Baking" and the "Fleischmann Laboratories." And I might also add the "Canadian Institute" at the Ontario Agricultural College at Guelph, which I understand is being opened this year.

And I am sure I can venture to say that America is better equipped in this respect than any other country, both as regards its scientists and laboratories, and the organization of their work.

You all know, of course, that the degree of sourness in flour, its acidity, affects its baking qualities, and that it is often ad-

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visable, when preparing the dough, to add sour milk or buttermilk. But if you ask me why it is advisable to sour the dough; if you want to know what part or parts of the dough will be favorably affected by the acid—then you are putting a difficult question. And it is just such questions that I propose to deal with.

That property of the flour which we have just referred to as acidity is really, to give it a more rational, scientific term, the concentration of the hydrogen ions it contains.

It is often thought that acidity and concentration of hydrogen ions are merely two different expressions, if not for one and the same thing, at least for two parallel qualities, so closely connected that it might seem unnecessary to bother oneself—at any rate in practice—with the newer and less familiar term. This, however, is altogether incorrect, and I may as well begin by pointing out the difference between the two.

The acidity of a solution is measured, as you all know, by titration, that is to say, by finding out how much soda of a given strength must be added to neutralize the acid. And supposing we have, say, a solution of hydrochloric acid, and one of vinegar, one of sour milk and one of an extract of flour, etc., all requiring the same quantity of soda to neutralize the same amount of solution, then we say that all the solutions are of the same degree of acidity, or sourness.

But are they all equally sour? Is one as acid to the taste as another? Not by any means. A solution of hydrochloric acid tastes much more sour than an equally strong solution of lactic acid or acetic acid. The reason is this. According to the theory of the Swedish scientist, Arrhenius, different acids differ in their tendency to throw off hydrogen ions, and it is only these hydrogen ions that taste sour, that is to say, affect the nerves of

taste. An acid such as hydrochloric acid, for instance, will at once throw off all its hydrogen ions when dissolved in water; lactic acid, on the other hand, and more particularly acetic acid, keep the greater part of theirs in reserve. The hydrochloric acid, therefore, is very sour to the taste, the other acids only slightly so, though all three are present in the same degree of strength, the same acidity.

And as with the sensation of taste, so it is with all the biological processes, from the growth of the seed in the cornfield or the growth of yeast in the tub or its action on the dough, to the process of digestion and all other physiological functions in the human organism. Throughout all these processes, the hydrogen ions play a certain part; they are indispensable, but on the other hand, there must not be too many of them. Each process has its optimal concentration of hydrogen ions; the one at which it works best. And you will understand that it is therefore of importance, if we wish to understand the biological process in question, that we should be able to determine whether the concentration of hydrogen ions is as it should be. There is no need for us to taste these ourselves; we can let suitable indicators do the tasting for us. One of these indicators is litmus, often used in the form of litmus paper, which can taste whether a solution is acid or alkaline. The paper turns red in an acid solution and blue in an alkaline. There are a number of these indicators, each useful in its particular sphere, according as the solutions are strongly or slightly acid, or strongly or slightly alkaline. You may be aware, for instance, that Cohn, Cathcart and Henderson have proposed, and successfully used, the indicator known as methyl red for determining the concentration of hydrogen ions in dough and bread.

In measuring the concentration of hydrogen ions, the actual magnitude is

denoted by means of a figure pH. I will not go further into its nature here, but merely mention, that its magnitude increases as the concentration of hydrogen ions decreases.

In diagram form it is customary to express the concentration of hydrogen ions as pH in numbers from 1 to 14. The figure 7 denotes the neutral point, those below it the acid region and those above the alkaline region. The lower the pH of a solution, the sourer it is: *n*/10 hydrochloric acid, for instance, has its pH—about 1. The higher the pH of a solution, the more alkaline it is: *n*/10 soda, for instance, has a pH of about 13.

The value pH expresses the quantity of active, effective hydrogen ions contained in a solution or mixture. The old term, acidity, though very useful in its own way, here only expresses the total contents of hydrogen ions, both the active and the inactive ions, the latter in reserve.

In all biological processes including those we have to deal with in the preparation of dough, and the baking of bread, it is the quantity of active hydrogen ions present that is most important; in other words, it is the pH of the dough and the bread we have to consider.

The manner of determining pH I need not enter into here, I will merely call your attention to the names of the indicators each of which is able, in its own particular field, to “taste” as I said before, what the pH of a given solution or mixture happens to be. Methyl orange, for instance, turns red when pH is about 3 and turns yellow when pH is about 4.5, and an intermediate shade when it lies between 3 and 4.5. In the same way, the important indicator, methyl red, when dropped on a piece of dough or bread, will turn red when the pH of the dough or bread is about 4.5, but yellow when it is about 6, while an intermediate pH will give an intermediate shade. The optimum pH for

a dough of wheaten flours is $\text{pH}=5$. It may vary a little, but if pH be essentially higher than 5, then the dough is not in the best condition.

As to Ropy Dough

The fault in dough when it is what is called “ropy” is a point which has been specially studied by Morison and Collatz, as well as by Cohn and his collaborators. It is generally indicated by a high pH (5.5—6), as the rope-producing bacillus, or *Bacillus mesentericus*, cannot withstand the combined effect of acidity and heat.

I have now said enough about the concentration of hydrogen ions and pH in a general way. But we have then to consider the preparation of the dough and the baking of the bread. What part does pH play in these processes?

It is, I think, generally recognized nowadays that the pH of the dough, is of the highest importance in ensuring good bread from an otherwise good dough.

The next question now is this: Why does this pH, why does the concentration of hydrogen ions affect the quality of the bread? What substances in the flour, or what processes in the preparation of dough, or the baking of bread, are affected by an alteration in the concentration of hydrogen ions?

We shall consider two sides of the doubtless very complicated effect produced by the concentration of hydrogen ions and any alteration in the same. The concentration of hydrogen ions is of essential importance:

Firstly, for the enzymes of the flour and yeast, and their effect; and

Secondly, for the physico-chemical condition of the substances in the flour, especially its proteins.

1) Hydrogen ion concentration and enzyme action.

Invertase is, as you know, an enzyme

found in yeast, and capable of splitting up ordinary cane sugar into the two sugars of simpler composition, glucose and fructose. A diagram, taken from one of the works published by the Carlsberg Laboratory, shows that the enzyme in question has an optimal zone at $\text{pH}=4.5-5$, its action decreasing very strongly with decreasing pH .

Malt Diastase

Malt has, as we know, a starch-decomposing enzyme, diastase, capable of splitting up starch and forming maltose and dextrine. Adler shows that the diastase has a marked optimum of activity at $\text{pH}=\text{about } 5$.

Much the same thing is shown by Adler, as to the relation of pH to the so-called proteolytic enzyme in malt—that is an enzyme which breaks up proteins. Here again we have an enzyme with pronounced optimum of activity at $\text{pH}=\text{about } 5$.

Indeed, we find, that hydrogen ion concentration answering to $\text{pH}=5$ or thereabouts give on the whole the best, or at any rate, particularly good conditions for a number of enzymatic processes, though by no means all of them.

Enzymes in Dough

But now the dough—we may keep to the wheaten flour dough, by the way. What about the enzyme action which may take place here?

The most important,—or at any rate one of the most important,—of enzymatic processes in dough is of a diastatic character, that is, it breaks up starch, just like the diastase of malt. By this process, maltose is formed from the starch in the dough, and the maltose again is split up by the yeast into glucose. This in its turn is separated by the yeast, in the process of alcoholic fermentation, into alcohol and carbonic acid. The importance of this

last-named item for the raising of the dough is one which I need not go further into here.

You realize, that in order to develop the necessary quantity of carbonic acid, we must have a sufficient amount of sugar to produce the carbonic acid by fermentation. This sugar can, of course, be mixed with the dough, and it is often done, by an admixture either of cane sugar or of glucose. But the best way is to have the sugar formed directly from the starch in the dough itself, as it is consumed by the yeast, and it is therefore important that the dough—or the flour from which it is made—should contain sufficient of the diastatic enzyme. Bakers have realized that the dough ought to contain suitable quantities of diastatic enzyme, and small quantities of malt are therefore often added to the dough. There are also a whole series of investigations as to the diastatic properties of the flour itself, but it was not until the publication of Rumsey's work, two years ago, that this question was given thorough consideration from all sides.

I will not go into details here concerning this fine work, which was published by the American Institute of Baking. I will merely mention, that Rumsey found a similar relation between pH and diastatic power to that found by Adler and other investigators in the case of malt diastase.

At Carlsberg Laboratory, we have been working on the same problem, and arrived at precisely similar results. You will see from the diagram, that the diastase of flour has its optimum at $\text{pH}=\text{about } 5$, or a little less. And you will understand from this that in preparing the dough, it is important, not only that the flour should contain sufficient diastase, but also, that the dough should be prepared with, or in process of fermentation attain, a concentration of hydrogen ions at which the diastase can act as it should. You will see

from the curve that at $\text{pH}=6$, the effect is barely half what it is at $\text{pH}=5$.

In the fermentation of dough, there are also other enzymatic processes taking place, which I shall not have time to go into today. I should like, however, just to draw your attention to a field of particular interest, and one which, as far as I am aware, has been very little investigated as yet. And that is, the question as to how, and to what extent, the protein of the flour is affected during fermentation of the dough by the proteolytic enzymes of the yeast.

2) Hydrogen ion concentration and the Physico-chemical properties of the Proteins in the dough.

In wheaten flour the substance known as gluten is far the most essential part of the nitrogenous ingredients. But apart from this, there are also smaller quantities both of an albumin and globulin, and of decomposition products of these substances.

Gluten, which consists of a mixture, or perhaps rather, a more or less loose association between two substances, gliadin and glutenin, is of the very highest importance in the manufacture of bread. It takes up water, and forms a tough, elastic and extensible mass, able to retain the carbonic acid developed during fermentation, and thus "raising" the dough. It is therefore very natural that the question as to relation between quantity and quality of the gluten on the one hand, and the baking value, or strength of the flour on the other, should have been made the subject of numerous investigations. According to recent works by Gortner and Sharp, and also Woodman, the gliadin seems to be of the same composition whether obtained from strong or weak flour whereas the glutenin differs in character from one flour sample to another. There is, therefore, every reason to follow with the great interest the researches made with a view

to studying alterations in the physico-chemical condition of the glutenin, the gluten and of the entire dough produced by alterations, say, in the concentration of hydrogen ions. In this field of work, a great deal has already been done by American flour and bakery chemists, who are unquestionably the leading experts on this question at the moment.

I will not, therefore, go further into this side of the question here, since it is in such good hands already, but will approach another side of it which, as far as I am aware, has not received the attention it deserves. I refer to the question as to coagulation and transformation of the proteins in the dough during baking, and especially to the part played by the hydrogen ion concentration in these processes.

In a coagulation process of this sort we must be careful to distinguish between two different phases of the process, each of which is affected in a different way by the concentration of hydrogen ions. The one phase is the denaturation, as it is called, of the protein, by heating, which occasions a chemical change in the substance, and often draws off water from it; sometimes also, an incipient decomposition takes place simultaneously with the denaturation. The second phase is the flocculation or precipitation of the denatured protein. In both these processes, the concentration of hydrogen ions is a very important factor. But while denaturation, and the accompanying decomposition proceed more rapidly and strongly the higher the concentration of hydrogen ions, it is quite a different matter with the flocculation.

There is, for each individual protein, a certain characteristic hydrogen ion concentration at which the denatured protein is precipitated best, and in the least gelatinous form. This hydrogen ion concentration, which for albumin lies at about $\text{pH}=4.8$, is called the isoelectric point of

the protein, and the farther the concentration of hydrogen ions diverges from this isoelectric point, the more difficult it becomes to precipitate the denatured protein, and the more gelatinous it will be.

These features are of great importance in all transformations of proteins by heating. I am unable to illustrate them for you by referring to experiments made with the proteins of flour—I do not think any such have been made—but I think it will be useful if such researches were made in this respect. I can, however, illustrate the position by describing an experiment we have made with another protein, namely, pure egg albumin. And in so doing, I will add a few remarks on the importance of this characteristic feature in connection with another industry, that of the breweries.

In each of 12 test tubes placed side by side and numbered 1 to 12 we place 5 cubic centimeters of a pure egg albumin solution containing forty to fifty milligrammes of egg albumin nitrogen and fifteen cubic centimeters of water and hydrochloric acid together. But in such a manner, that the tube on the extreme left is given fifteen cubic centimeters of water without hydrochloric acid, the quantity of hydrochloric acid being increased until we reach the glass on the extreme right, which is given fifteen cubic centimeters of pure $n/100$ hydrochloric acid.

After heating for fifteen minutes in a water bath, at a temperature of sixty to sixty-five degrees, Nos. 1 and 2 will be quite clear: there will be a precipitate in Nos 3 to 6, most in No. 4, while the rest have no precipitate, but only an opalescence, decreasing from left to right along the row. It looks, then, as if coagulation had only taken place in the middle samples, whose concentration of hydrogen ions lies near the isoelectric reaction of egg albumin. Actually, however, the case is quite different. When the samples are

filtered Nos. 1 to 6 filter clearly and easily, the others with difficulty. On adding a buffer mixture (sodium acetate and acetic acid) at ordinary temperature, which brings all the filtrates to the optimal hydrogen ion concentration for flocculation, answering to $pH=4.8$, we get a precipitate in all the samples except Nos. 3 and 4 and most in the samples containing most acid.

As all the samples have now the optimal concentration of hydrogen ions for flocculation, all the denatured egg albumin will have been precipitated, and if we now again filter the samples and heat the filtrates as before, any non-denatured egg albumin still remaining in the filtrates will now be denatured and precipitated.

This last heating leaves precipitate only in tubes Nos. 1 to 9, and the quantity is greater according as the samples have had less acid.

The final position then, is this. The egg albumin in the most acid samples was completely denatured by the first heating, but no precipitation took place, because the concentration of hydrogen ions far higher than the optimum for flocculation. On the other hand, the sample which showed most precipitate on the first heating, namely No. 4, was by no means completely denatured, since it yields an abundant precipitate on the second heating. But all that was denatured by the first heating was also precipitated because the concentration of hydrogen ions in this sample was at the optimum for flocculation.

Other things being equal, then the rate of denaturation will be greater the higher the concentration of hydrogen ions in the solution. But flocculation of the denatured protein takes place only at isoelectric reaction, or near it.

In the boiling of the wort at a brewery, it is of the highest importance that the coagulable protein should not only be de-

natured, but also precipitated, as it would otherwise later on be deposited quite slowly, and thus cloud the beer. The brewer has therefore to see that the hydrogen ion concentration of the wort lies somewhere near the isoelectric reaction. Now the water used in brewing contains certain alkaline ingredients; the malt, on the other hand, certain acid ingredients, which neutralize them. During the war, when breweries were obliged to reduce the quantity of malt, while the quantity of water remained the same, the alkaline ingredients gained the upper hand, and the wort became too alkaline; the precipitation of proteins therefore less complete, and the beer in consequence, less able to keep for any length of time. This difficulty, however, was got over by slight, but systematic acidulation of the wort until it reached the desired concentration of hydrogen ions. And the method was found so excellent in its effect on the keeping quality of the beer that it is still used in many places, even now that normal conditions have been restored.

As practical bakers, you may very reasonably ask, "what is the use of all these highly specialized scientific investigations to us?" I grant you at once, it would be ever so much simpler if we could, by a single line of research, find a method of determining the baking value of a given sample of flour. And in this connection I would draw your attention to Bailey's valuable work on the connection between the baking value of the flour and the extensibility of the dough.

On the other hand, the question as to baking value of a flour is one of so complicated a nature because the strength probably represented the result of the cooperation of many different factors, of which I have here touched on only a few. To get to the bottom of the question we shall, I think, first have to study the importance of each factor separately. And

this means a great deal of work, and a great deal of time.

It will need, on your part, Gentlemen, as representing the practical side, a great amount of patience. And on the part of the scientific investigators, not only skill, but also perseverance. And finally, it calls for the most intimate cooperation between both sides.

It has been a great pleasure to me to see the way in which this cooperation has been taken up in America, on a broader basis than anywhere else. And I believe, that in the case of such a comprehensive task as this, where individual effort would never suffice, cooperation is the only way. Such cooperation as has already existed for some time past between the American Institute of Baking Research Laboratories, and the Division of Agricultural Biochemistry of the University of Minnesota is therefore a most welcome sign. And I have no doubt that this cooperation, like the other great American efforts, will produce an important contribution to the solution of the great and important question of the baking value of flour.

Bread and Meat

You will be interested to know that our 1925 advertising campaign will contain a large number of posters and display signs featuring bread with different kinds of meat, in line with the slogan of the American Institute: "More bread—better fed." Our entire selling organization is instructed to work for the "bread and—" campaign.

—Charles W. Meyers,

Director of Trade Relations, Armour & Co.

Will you please send me 6 copies of *Baking Technology* as soon as convenient. We want to study the report of the Toast Campaign's progress as a basis of work to be done here.

C. C. Latus, Secretary,
Pennsylvania Bakers Association.

An Advertising View

SINCE seeing the advertising display at Atlantic City and hearing the talks on merchandising delivered there by bakery experts, I know that in the strictest sense of the word we never have sold any merchandise. Patrons have merely ordered our goods and we have filled their orders, and that's all.

When we opened our capacity was less than 500 loaves a day and we did not own a dollar we could call our own. We borrowed all we dared from the bank but never overstretched our credit and met all paper when due, or paid a part on each note and got a renewal.

After we had been operating four months I increased our capacity by buying another oven and I have done this twice since until now we are fairly well equipped and our equipment is nearly paid for. Our capacity is 3,500 loaves and I am keeping one man busy on cakes. Last year we did nearly \$60,000 worth of business, and last week I could have sold out for \$8,000.

But we have not scratched the surface of our power to grow. I know something of the fundamentals of modern business but not enough. I know that our business is lop sided. Every manufacturing business has four principal departments whether the proprietor knows it or not. They are: purchasing, manufacturing, merchandising, and accounting. I feel that our purchasing and manufacturing departments are in good shape but they would be held back and strangled by inefficiency in selling and accounting, except that they are too strong. I believe in advertising. We have never done any simply because there were so many things to do we were overwhelmed.

We are going to have a real bakery. We are going into debt again. We are

starting to rebuild. And we are going to have the four distinct departments I spoke of. We are going to develop our merchandising department until we have a display of things accomplished that will compare favorably with your fine exhibit at Atlantic City.

—From a letter of a Florida baker.

Toast—In New Zealand

WHAT about your American toast campaigns? We have been keenly interested in your American idea that toast should be slowed up and not made with flash heat that kills the flavor. Out here in New Zealand we have plenty of fire places in which the old-fashioned "parched" toast is made. Fireplaces supply practically the only heat known in New Zealand, since the thermometer is only down to 29 now and this is the winter season. The New Zealand diet is being widely criticised by the doctors as being too "soft." They blame the bad teeth of our people to too much soft food and recommend toast as a corrective.

Here at the University of Otago we get hard, dry, cold toast three times a day—and try to eat it. Even when they serve you fresh toast in a hotel it is put in what they call ventilators so it is never served hot. That makes it bad.

Aside from the cold toast, and cold houses, and the enormous amount of tea you are expected to drink I am having a wonderful time. We are surely grateful to your Dr. Rumsey for his researches telling us why toast should be piping hot, to give its delicious flavor, and should be made slow enough to bring out its camomilized flavor, instead of the carbonized flavor of the flash-heat product.

—L. B. Stroms, teacher of Nutrition
and Chemistry at the University
of Otago, Dunedin, N. Z.

Some "Anti-Fat" Breads

*Their Selling Quality is Found to be Based on the
Amylophobia of the Overstout*

By C. B. MORISON

THERE appears to be considerable interest in so-called "anti-fat" or "reducing" breads among those anxious to bring their bodily symmetry within the limits set by the prevailing modes. These products are advertised in language reminiscent of the old-fashioned patent medicine man and suggest in alluring terms the victory over fat, and the return to the sylph-like grace and buoyancy of the adolescent form.

Phrased in the purple passages of old romance, these advertisements and testimonials invite one to expend but three or four times the price of a pound of good white bread, and by the simple process of ingestion and digestion reduce their corpulent proportions to those of a sylph or wood nymph in about two weeks.

Some of the statements used in the advertising of these products are not only highly extravagant in their special claims, but most provocative to anyone who has the slightest knowledge of the composition of white bread and its nutritive properties.

An over-exuberant advertiser of one of these breads has recently stated his credo as follows:

"I DO NOT BELIEVE IN WHITE BREAD
NOT ONE LOAF COMES
FROM MY GREAT OVENS.
TO COMBAT FAT
EAT.....

Each day thousands and thousands of loaves of Special Breads come from my great ovens. But not one loaf of White bread. White bread while wholesome is overloaded with starch and starch makes fat. Then too white bread lacks valuable food elements needed to renew tissues to enrich the blood—to build bone and muscle. Hence we do not believe in white breads.

We bake only Special Breads, each for definite purposes.

.....combats fat."

It is rather surprising to note that the advertiser who "does not believe in white bread" is a baker and not a food crank or professional propagandist; since most of such statements nowadays emanate from the latter sources.

In view of the character of this attack on white bread and the importance of the subject, a sample of this "anti-fat" bread, baked in the ovens which are free from the contamination of white bread, was purchased in the original package at a nearby store and analyzed in our Analytical Laboratory.

The results of the analysis of the sample of anti-fat bread and also that of ordinary white bread made with milk, for purposes of comparison are as follows:

Analyses of an Anti-Fat Bread and a Milk Bread.

	Sample 3754 "Anti-Fat" Bread	Sample Milk Bread
Moisture	38.26%	36.00%
Protein (Nx6.25)	18.71%	9.25%
Total Nitrogen-Free Ex- tract	36.03%	50.66%
Fat (Total Lipoid Ma- terial)	3.55%	2.25%
Crude Fiber	1.26%	0.18%
Ash	2.19%	1.66%
	100.00%	100.00%
Starch, Diastase Method,	29.05%	46.00%
Soluble Carbohydrates, Dextrins, Sugars, etc.,	6.98%	4.55%

If we calculate the total energy in calories of the two breads, according to the above analyses for one pound of each bread respectively, we will find that the "anti-fat" bread is equivalent to about

1137.9 calories, and the milk bread to 1178.6 calories.

In the above calculation the factors used are 1814 calories per lb. of protein, 1814 calories per lb. of carbohydrate (nitrogen-free extract), and 4082 calories per lb. of fat.

	Anti-Fat Bread	Milk Bread
Protein Calories	339.4	167.8
Carbohydrate Calories	653.6	919.0
Fat Calories	144.9	91.8
Total Calories	1137.9	1178.6

It is apparent from this calculation that the total energy value of the two breads is about the same. The difference in total calories is only about 41. The digestibility co-efficients of the anti-fat bread would be similar to those of a whole wheat bread.

If the composition of the "anti-fat" bread is compared with that of white (milk bread), it will be noticed that it is a little over twice as high in protein and less than three-quarters lower in carbohydrates. The fat or total lipid material obtained by the modified method for fat in bread is somewhat higher than that of the milk bread. The crude fiber or roughage is much higher than that of the milk bread and the ash is also somewhat higher as would be expected.

The composition of the "anti-fat" bread classifies it as a product lying within the usual range in composition of an ordinary whole wheat bread and a gluten bread. Its protein is twice as high as that of the whole wheat breads, but it is somewhat lower than that of ordinary gluten bread. The starch content of a good whole wheat bread is about 40 to 43%, and in many gluten breads it is less than the 29.05% found by the diastase method for the anti-fat bread.

As far as starch is concerned, it is evident from the analysis that if the consumer bought a loaf of ordinary white bread,

a pound loaf, and ate half of it, the amount of starch consumed would be less than eating a pound of the anti-fat bread, at a cost of about five cents instead of thirty cents or more, the cost of a pound of the special bread.

The amylophobia or fear of starch as a source of overweight is a popular bugbear which is somewhat over-exploited. While an excess of overbalancing of carbohydrate foods is to be avoided in the diet there is not much danger of any one becoming a victim of overweight from this source through the consumption of white bread.

If a well balanced diet contains from 60 to 65% of its total energy as carbohydrates, 20 to 25% as fats, and 10 to 15% of good quality protein, with sufficient inorganic constituents and the necessary vitamins, it can be readily seen that with an energy requirement of 2500 calories per day that the carbohydrates should supply from 1500 to 1625 calories of the daily food supply. Fifteen hundred to 1625 calories would be equivalent to from 375 to 406 grams of starch or sugar.

A pound of ordinary white bread with a moisture content of 36% would only supply about 230 grams of carbohydrates or 920 calories if an individual consumed one pound of bread daily. There would, therefore, be but little danger of consuming an excess of carbohydrates from bread under proper dietary conditions.

If we have an excessive carbohydrate consumption in the individual food intake it is due largely to the use of cane sugar in the form of candy and soft drinks, and not to the excessive use of bread.

In regard to the statements of the advertiser of this product, "that white bread lacks valuable food elements needed to renew tissues and enrich the blood,—to build bone and muscle", it is only necessary to refer to the investigations of Sherman, Eddy and many others, as well as to

those of our laboratory on the nutritive properties of white bread made with milk, to refute such a sweeping condemnation. These experiments have shown that white bread made with milk contains protein of high quality, and increased amount of inorganic constituents notably calcium and phosphorus, and also of the vitamins A and B. In discussing white bread, the formula from which the bread is made requires consideration, in order that the facts may be treated correctly. It is not only incorrect but insidious to generalize on white bread without proper attention to this consideration.

Other statements of the advertiser, such as that one "flour ingredient costs 900% more than high grade white flour," and "only one mill in America makes it and practically all starch is removed," are rather surprising since we find that the anti-fat bread contains 29.06% starch by the diastase method. It is therefore difficult to understand why so much starch is present in this product, unless from the secret nature of the ingredients a remarkable synthetic process unknown to chemists takes place with the production of starch! This would be most wonderful, if true!

Analyses of this bread from other sources than our own laboratory have reported starch to the extent of between 32 and 33% in sample containing about 38% moisture.

The ash constituents of this "anti-fat" product do not possess significant interest in comparison with the amount of calcium and phosphorus found in either whole wheat or milk bread, and as to the vitamins, no evidence is presented as to why these are of interest in comparison with these breads.

There are many other "anti-fat" or "reducing" baked cereal products on the market, which contain substances usually found in the drugstore but absent from bread.

It has not been our purpose to discuss these breads at this time but they are mentioned as of interest in relation to the general subject. It is significant, however, to note that these breads are recommended to the "would be reducer" for use in connection with low calorie and high protein diets.

Dieting for the reduction of overweight is best conducted under proper medical supervision, with full knowledge of why one is reducing.

In many cases obesity and overweight are not due to the results of diet, and for this reason it is but common sense to refrain from adopting dietetic and therapeutic measures without competent advice.

In conclusion we wish to emphasize what has been previously pointed out, that the elimination of all white bread from the diet, under the impression that it is "overloaded with starch" and "highly deficient in nutritive properties", is a perversion of the facts as we know them today.

A Restaurant View

Few outlets for bread are so important as the restaurant and hotel outlet, which is growing faster than perhaps any other. Therefore the contact noted in this extract from a letter seems to point to better underdoings for days to come:

We find the reports from the American Institute of Baking to be an inexhaustible source of information and inspiration. Inasmuch as the interests of our respective industries are somewhat allied we give your publications the closest attention. While we are possibly not qualified to say so, we feel that if bakers generally make use of the important information your Institute sends out their troubles will be found to yield very easily to the treatment prescribed.

—Ray Fling, managing editor,
the National Restaurant News.

One Man's Faith

HOW simple, comparatively, does the problem of "talking the language" with a baker become, when that baker has done already in his own community the tasks that his National association must do for him in the world at large.

In a little western town recently an Institute staff member tried to get six bakers together who had not met before in recent months. One was a Rotarian and he "stuck" when others yielded to red-eyed anger. It is just so with other organizations, for this reorganizing world will soon call for a baking industry at work on a vastly different plane from that of a decade ago.

What a pleasure it is, therefore, to record the activities in which one baker found time to engage in his little home town in the Pacific Ocean's most romantic island. At Honolulu, Hawaii, S. H. Love, of Love's Biscuit & Bread Co., has loved his town and has proved it in this manner: he is now president of the Chamber of Commerce of Honolulu, which has over 500 members, is vice-president of the Associated Chambers of Commerce, representing all Hawaii; is a member and past-president of Rotary, the strongest civic organization in his community; president, Honolulu Advertising Club, whose 600 members devote their club activities to keeping Hawaii on the world map; vice-president Honolulu Council of Boy Scouts, which keeps a strong boy scout organization in the field;; and last but not least, member, United States Chamber of Commerce.

Is it any wonder that such a man has 150 employees at work, and is doing so much business that he could not get "to the continent" for the Atlantic City convention? "Aloha Nui" he writes at the end of a letter wishing American bakers' Association the best of luck in its struggles ahead.

Organized

If Massachusetts, Connecticut, Maine, New Hampshire and Vermont, make a natural unit for a sectional baking convention, and the Potomac states make another, how about the Intermountain states of the Far West?

Not so long ago Montana was thought to be so far away from Spokane and such a great distance from Denver that the Intermountain country never would get together. But all that is over now. The Rocky Mountain Bakers Association lifts up its head for recognition, along with the Southern California bakers, the far-famed Southeastern, the New England Association, and those of the mid west.

It includes Idaho, Utah, Montana, Wyoming, Colorado, and New Mexico. And it has established offices in the Denham Building, Denver, Colorado. From that address E. R. Jones, the newly elected business manager, writes for data that the National association may think of value to this Intermountain group. With the Intermountain states organized, where is there left a weak spot in bakery activity upon the whole National map?

Out For Success

"I have been anxious to get in touch with the proper parties whom I can depend upon to help me make a success of the baking business. I would like to know all about the methods of the American Institute, and how you give out information to bakers."

Thus writes a baker of New York. The reply was that it was for just such bakers that this Institute was founded to consolidate and codify and give out the best known data on all phases of baking. He was told to join his association, to send in his bread, and that he would receive careful, continuous reports based on a careful study of it by our Service Department.

Uncle Sam and the Baker

*How They Can Best Get Along Together in the Production of
Watched and Protected Pure Food.*

By W. W. SKINNER*

Of the Bureau of Chemistry, Washington, D. C.

Whether he will or not every baker meets up with inspectors from the Pure Food Enforcement division of the government. It is called the Bureau of Chemistry, first made famous by Dr. Harvey W. Wiley. If the baker knows what it is driving at and why, he may make a contact pleasant that through fear of officious interference might otherwise be unpleasant. Here is an article that tells the baker what Uncle Samuel's officers expect of him and what ideals they wish him to aim at. Of course the end of it all is wholesome food, protected from rotted and wormy blueberries, in the case of pies, and from bad substitutes for pure foods in the case of other baked goods. This article is printed here as a "get-acquainted" gesture between all bakers and their Uncle Samuel who wishes them to prosper in the production of good goods.

BREAD is the staff of life, as much so today as when the Shepherd King of Israel sang in a Psalm of praise, here is the "bread which strengthens man's heart" and therefore called the staff of Life. It is the staff upon which the efficiency and welfare of the Nation lean most heavily. The future progress of the Nation depends upon the maintenance of the quality and the sufficiency of the supply of our daily bread. To Him above we petition each day for the blessings of our daily spiritual bread, but our physical and mental well-being, in so far as they depend upon our supply of daily bread, are committed largely to the keeping of the Guild represented at this convention. In taking over the preparation and distribution of the Nation's daily bread, you have assumed a large obligation and a responsibility which you should accept with great seriousness.

The Guild of Bakers is a peculiarly honorable one and you have a rich heritage from your Colonial ancestors in which you

should take a just pride. Some of you perhaps have noticed upon the great seal of the City of New York the outline of two barrels, but probably few of you are aware that these are intended to represent barrels of flour. Milling and baking were the important twin sisters of Colonial industry, so that when the great seal of Manhattan was adopted in July, 1686, the city council decreed that the center of the shield should be occupied by the spreading sails of a Dutch grist mill between the intersecting arms of which should be placed two barrels of flour and two beavers, thus symbolizing the importance and dignity ascribed by our Colonial ancestors to the quest for a sufficient supply of food and raiment, which, together with the desire for shelter, constitute the trilogy upon which man's culture and very civilization are founded.

We find that the individuals engaged in the milling and baking industries of Colonial times were the prominent people of the community. Thus, the list of licensed bakers given in the records of

* In an address at our Atlantic City Convention.

New Netherlands (New York) for 1686 contains twenty-four names, some of them women, with the further information that "the men were all property-holders and several are aldermen or other wise prominent."

Because of the great importance of the milling and baking industries to the welfare and development of the community, it is not surprising that the regulation of these industries received the attention of the legally constituted authorities early in the history of our Colonial development. Probably the first food law in America was an order of the Council of New Netherlands passed on July 19, 1649, for bakers to use only the legal standards of Old Amsterdam and to furnish themselves with such measures and weights by August 1, and on November 8, 1649, the Council ordered the baking of white bread and cakes for sale to individuals and Indians stopped. This was followed by the first recorded assize on bread. Probably the first labeling law was the assize of March 25, 1661, in which the court "orders each baker to mark his bread with a particular mark on pain of forfeiture of any unmarked bread and a fine of 25 guilders, also to bring to the office of the Secretary of the City the stamp with which he intends to mark his bread, so that it may be registered." The marks of seven bakers were registered as a result of this order.

Probably the first real pure food law in America was passed by the Council of New York after the Province had come under the English Rule, on July 1, 1676, which provided that unfit grain shall not be ground or bolted or used for distilling and for fear that the excellent foreign demand for their flour might be injured by the exportation of an inferior product, the officials of Colonial New York exercised with jealous care their prerogatives

in controlling the purity of this commodity. Later, in the Massachusetts Bay Colony, the regulation of bread and its ingredients was accepted as a proper and legitimate function to be exercised by the governing body for the common welfare. This is shown by the following law, enacted by the Province of Massachusetts Bay in 1696:

An act for the due assize of Bread. Be it enacted by the Lieutenant Governor, Council and Representatives in General Court assembled and by the authority of the same, that henceforth every loaf-bread baker shall have a distinct mark for his bread, and keep the due assize hereafter expressed as well for what he bakes for sale as to be spent in his family; that is to say, the assize of bread shall be rated according to the middle price of wheat, not to be altered but upon the increasing or decreasing of sixpence in the sale of a bushel, the penny loaf to weight by avoirdupois weight as is hereafter mentioned according to the different prices of wheat by the bushel.

Another interesting record is that of July 23, 1720, as follows: "That it shall and may be lawful to and for any of his majesty's justices of the peace, or any one of them, within their respective count (ie) (y) s, and any of the selectmen, or any one of them, in their respective towns, or any two of the clerks of the market, at all times hereafter, in the day-time, to enter into any house, stall bake-house, out-house or warehouse, belonging to any baker or seller of bread, there to search for, view, weight or try all or any of the bread of such person, or which shall there be found; and if any bread shall there be found wanting, either in the goodness of the stuff whereof the same shall be made, or in the due working or baking thereof, or shall be deficient in the due weight, or shall not be truly marked, according to the directions of this act, or shall be of any other sort than shall be allowed by virtue of this act, that then, and in every such case, it shall and may be lawful to and for such justices or

justice of the peace, or selectmen or selectman, or any two clerks of the market, to seize and take the said bread so found, and cause the same to be forthwith given and distributed to the poor of the town where such seizure shall be made. And if any baker or seller of bread, or other person or persons, shall not permit or suffer such search or seizure to be made by virtue of this act, or shall oppose, hinder or resist the same, he or they, so doing shall, for every such offence, forfeit the sum of three pounds, to be disposed of as the other fines, and to be had and recovered in the summary manner and form hereinbefore first mentioned."

Drying of Bisket.

Because of the recent controversy over the proper tolerance for moisture in bread a proviso attached to the Act of 1720 is of interest. It reads as follows: "That a proper allowance be made for the drying of bisket, yet never to exceed two ounces for drying, at the lowest price of wheat, and so proportionably."

Probably the first pure food law passed by a sovereign State was the act of the Massachusetts Legislature of March 8, 1785, entitled "An Act Against Selling Unwholesome Provisions." It reads:

Whereas some evilly disposed persons, from motives of avarice and filthy lucre, have been induced to sell diseased, corrupted, contagious or unwholesome provisions, to the great nuisance of public health and peace:

Be it therefore enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, That if any person shall sell any such diseased, corrupted, contagious or unwholesome provisions, whether for meat or drink, knowing the same, without making it known to the buyer, and being thereof convicted before the Justices of the General Sessions of the Peace, in the county where such offence shall be committed, or the Justices of the Supreme Judicial Court, he shall be punished by fine, imprisonment, standing in the pillory, and

binding to the good behavior, or one or more of these punishments, to be inflicted according to the degree and aggravation of the offence.

Control a Safeguard.

My purpose in citing these excerpts from our Colonial laws has been, not to review the history and development of food legislation, but to bring out the demand, which runs all through our early governmental records to the present time, that commodities which your industry uses and the products of your work and processes shall be subject to governmental regulation. Such control is not only a protection to the consuming public but it also safeguards the milling and baking industries.

The question propounded to me by your committee on program is "What is the Government doing for the baking industry?" Had I been given my own choice of subject, I should have preferred the question, "What is the Bureau of Chemistry doing for the baking industry?" as one upon which I am better qualified to speak. I am glad of an opportunity to answer this question of the baking industry, for in attempting to do so I feel that as an administrator in a great corporation I am making a report of progress and accomplishment to a portion of our stockholders. Your representatives of the baking industry are some of the tax-paying stockholders of the greatest corporation on earth,—the Federal Government. Of what value is the work of the Bureau of Chemistry to the Baker and the Miller, is a question you may well ask of me.

Activities of Bureau.

The activities of the Bureau fall into two main lines, research and regulatory work. The research work, which covers all classes of food products, develops information of direct and indirect interest to the baking industry; the regulatory work involved in the enforcement of the

Federal food and drugs act aids the baking industry, by improving and assuring the quality of the materials used in baking, by checking some forms of unfair competition, and by increasing the confidence of the public in the purity and wholesomeness of bakery products.

Research for Bakers.

How to improve the quality of wheat, corn, and other cereals by increasing their protein and mineral content is a problem to which we are giving much attention. As you know, the chief factors that give nutritive value to food, are the proteins, the fats, the carbohydrates, the mineral salts, and the vitamins.

Progress has been made in our effort to increase the protein content of wheat. Much wheat is bought on the basis of protein or gluten content. When climatic conditions in a particular wheat-growing region during a given season cause the crop to be low in protein, the buyers for the baking industry go elsewhere for wheat of a higher protein content. Our experimental work has shown that the application of nitrate fertilizers when the grain is beginning to head materially increases the protein or gluten content of wheat. The first thing to be done, of course, was to determine whether or not the character of the wheat proteins could be modified. How best to supply the fertilizer to the growing wheat is being determined by a series of tests, and the effect of different types of cultivation on the protein content of the wheat is being studied. Sufficient progress has been made to indicate that leaving space for entering the wheat field and applying fertilizer at advanced growth stages does not decrease the yield for a given area, or may even increase the yield.

The big thing, however, is the evidence that it is practicable to improve the quality of the grain. If this work results, as

we hope it will, in increasing the protein content of much of the wheat grown in the United States, the baking industry, instead of paying a very large premium, as it now does, for a limited supply of wheat with a high gluten content, may find that a larger and larger proportion of the wheat crop will become available for the production of high-grade flour baking. To the farmer it means more profitable wheat culture, since his high gluten wheat is always in demand at a premium over ordinary wheat.

Work in our Protein Investigation Laboratory has developed information which will enable the baker to increase the nutritive qualities and value of bread and other food products. At one time it was supposed that proteins from different sources were of equal nutritional value. Researches have shown that proteins from different sources vary greatly in their nutritional value. Proteins from some sources, because they lack certain nitrogen compounds known to chemists as amino acids, are totally inadequate for growth and development if used as the sole source of protein in the diet. Thus is being laid the foundation for increasing the nutritive value of our daily bread.

Wheat flour is somewhat deficient in one of these amino acids, lysine. This deficiency, however, may be overcome by the use in the bread formula of milk or other protein material available for bread making. Some years ago the specialists of the Bureau of Chemistry developed a bread which contained all the elements necessary to support life and maintain growth. White rats fed on the bread made in accordance with the new formula gained more than the average normal growth. In this bread one-fourth part of wheat flour was replaced by peanut flour or soy bean flour and the inorganic salts needed for skeletal tissue and butter to furnish the necessary fat-soluble vitamin were added.

One corrective supplemental requirement was found necessary to make a complete diet—a little orange juice or green vegetables to prevent scurvy. The mixed flours gave the necessary proteins, water-soluble vitamins, fats, and carbohydrates. Bone material was supplied by the salts present in the flour mixture and by the addition of a small proportion of common salt and calcium phosphate. With this bread and water as their sole diet rats attained normal growth.

Nutritionally Perfect Loaf.

Since it is not ordinarily expected that bread will be the only article of diet, this nutritionally perfect bread will probably never take the place of ordinary wheat flour bread. Nevertheless, it is believed that there will be considerable demand for the nutritionally perfect bread on the part of many people and bakers might profitably make such a bread as a specialty.

Specialists in our Oil Laboratory are conducting investigations on the composition of vegetable oils some of which are used extensively in making shortening with a view to improving the methods of their manufacture and utilization. It is believed that these researches will so extend our knowledge of oils that we may utilize them to much better advantage in the future than in the past, and perhaps find a way to make better and cheaper shortening agents.

As the result of a process developed in the Bureau, maltose sugar may be produced commercially in the near future from cornstarch, corn hominy or other starchy materials. This product is obtained in the form of fondant-like masses, not in a granulated form like granulated cane or beet sugar. It can be malted and cast into molds like fondant made from cane or beet sugar. It can be used in the candy industry in producing chocolate

cream centers and other cream confections and in the baking industry for similar purposes, icings, etc.

Sugar from Corn.

For many years chemists have known that crystalline maltose sugar can be made from corn starch. Lack of control of the process, however, made it impossible to produce crystalline maltose sugar from starch economically. The new method enables the chemist to control the process so that it proceeds with regularity and certainty. The process is simple and involves no unusual equipment. The final cost should be low, so that as a sweetening agent alone it should compete successfully with sugar and dextrose.

The process consists essentially of mashing either corn starch or corn hominy with malt, which liquefies the product and converts the starch into maltose sugar. After decolorizing with carbon and evaporating to a given density, the sirup is allowed to cool, after which it is inoculated with a little crystalline maltose and allowed to stand from one to several days at room temperature, when it sets into the solid crystalline fondant, the crystals being so fine that they can hardly be distinguished under a high power microscope.

As this new advance in producing crystalline masses of maltose sugar from corn has yet to be industrialized, it is too early to realize its bearing on the utilization of corn. The investigational work is not entirely complete, but has proceeded far enough to demonstrate that it is entirely practicable to make an excellent grade of crystalline maltose sugar from corn starch or hominy.

Recently one of our specialists developed a process for making a cocoabread which may prove a profitable side line for some bakers. It may be made by using ordinary bread formulas with only slight changes.

Since cocoa contains about 20 per cent of fat, other shortening may be used in smaller quantities or omitted altogether. Additional sugar must be used to overcome the bitterness of the cocoa. To make a bread that is neither sweet nor bitter, it is suggested that the amount of sugar called for by an ordinary formula be used and in addition the same weight of sugar as of cocoa. The amount of cocoa may be varied to suit the individual taste. Replacing one-tenth of the flour by cocoa gives the bread a distinct cocoa color and flavor. All cocoa bread is dark, the depth of color obtained varying with the quantity of cocoa used. Aside from the change in color, there is very little difference in appearance between cocoa bread and white bread, that is, the shape of the loaf, the volume, the texture or grain, the elasticity are about the same. Cocoa dough takes a little longer time to rise than other doughs because the cocoa retards fermentation. This bread does not become stale as soon as ordinary bread. Next to lemon, chocolate is the most popular flavor in America. Bakers have in this suggestion possibly a profitable addition to their products. Furthermore there is a large over-production of cocoa powder, rich in protein matter that ought to be utilized for human food.

Improving Materials.

In its enforcement of the Federal food and drugs act the Bureau of Chemistry deals with many products which the baker buys. Adulteration and misbranding of these articles have been greatly reduced. For instance, in cooperation with State and City Food officials, the Bureau of Chemistry has given much attention to improving the quality of shell eggs sold on the American market. We have advocated the careful candling of all eggs in interstate commerce in order to eliminate eggs that are spoiled or may

be spoiled before they reach the consuming centers. The Department of Agriculture has put out much literature upon the best methods of candling eggs. This work has resulted in a marked improvement in the quality of shell eggs shipped into interstate commerce. A much lower percentage of spoiled or rotten eggs is being found on the market than formerly.

Attention has also been given to the sanitary condition under which frozen eggs are put up. An effort has been made to eliminate the use of spoiled eggs in these products. Scientific work has been carried on to improve the methods by which the eggs are broken, frozen, stored, and handled, in order to reduce the chances for contamination that may result in the deterioration or spoilage of the eggs before they are ready to be used by the bakers. I believe that a comparison of the eggs, both shell and frozen, on the market today with those sold a few years ago will show that there had been a marked improvement in the quality of these food products, which play such an important part in the development of your industry.

We have also given some attention to the dried egg powders, which are imported in large quantities from China where eggs are cheap. A few years ago much of the dried egg imported from China was contaminated with zinc, owing to the use of zinc apparatus. The Federal food and drugs act provides that all adulterated or misbranded foods and drugs offered for entry into the United States shall be refused admission. While such service as this is intended primarily for the protection of the ultimate consumer its importance and value to the baker would appear to be almost self evident. As a result of the activities of the Bureau of Chemistry, definite changes were made in the method of manufacture

and contamination by zinc has been practically eliminated from dried egg products.

Recent years have shown an improvement in the moisture content of flour shipped into interstate commerce. As an extensive purchaser of flour the baker certainly does not desire to pay flour prices for water. The weight of flour can be materially increased by permitting a larger percentage of moisture than normal to remain in the flour. Our examinations of samples of shipments of flour showed that much of it contained too much moisture. Seizures were effected of shipments of flour containing too much moisture in various parts of the United States and a definite campaign was inaugurated against the shipment in interstate commerce of flour containing more than 13½ per cent of moisture. As a result of this work, there has been a great improvement, and most of the flour shipped in interstate commerce today is not adulterated by the addition of an excessive quantity of water.

Protecting Our Pies.

Recently our inspectors have been investigating the packing of blueberries, which are used extensively in baking pies. Investigation during previous years had shown that the canners were not taking enough care to eliminate berries that contained maggots or that were moldy or rotten, or to remove stems, leaves, and other foreign material which were gathered with the fruit. Last season it seemed that a larger proportion than usual of the blueberries contained maggots when picked. Our specialists are now in Maine assisting the canners in developing methods for eliminating foreign material and berries that are infested with maggots or are otherwise unsuitable for canning. At first both the canners and growers opposed this work,

but many of them are coming to see that the improvement in the pack that is being made as a result of the constructive work of the Bureau of Chemistry will directly aid the industry. It is apparent that should consumers gain the impression that blueberries containing maggots were being canned extensively, the market for this product would be seriously impaired. The packing of blueberries containing maggots or other foreign material is a violation of the Federal food and drugs act if the berries are shipped into interstate commerce and it is the duty of the Bureau of Chemistry to see that only berries fully meeting the requirements of the law are shipped. Because of the work now under way there is a great improvement in the quality of the blueberries that are being canned for baking. The following notice to canners of blueberries has been issued this year.

During the past year the Bureau of Chemistry has found it necessary to recommend proceedings under the Federal food and drugs act which resulted in the seizure of canned and barreled blueberries shipped in interstate commerce because of the presence of trash, insects or other extraneous matter. Consignments have been examined which contained excessive trash of the nature of leaves, stems, twigs, foreign fruits, etc., and many shipments were found to contain blueberry maggots, caterpillars, stink-bugs, spiders, etc. In some cases decayed berries were found.

This announcement is issued for the purpose of warning packers that all possible precautions must be adopted to insure the packing of products free from adulteration. Shipments found upon examination to contain maggots, or other insects, excessive extraneous matter, decayed fruit and the like, will be subject to seizure, and in addition, the shipper will be liable to prosecution in accordance with the provisions of the law. Institution of such proceedings is not only authorized by law, but is deemed necessary to afford proper protection to the consumer and to those in the industry who are taking the necessary precautions."

The thorough and efficient government-

tal inspection of such material is the only reliance the average baker has to assure the quality of the raw materials which determine the character of his finished product. Such service to him is of inestimable benefit, rendered to him generally without him knowing anything about it.

Work has also been done in perfecting the canning of cherries in Michigan and New York and the canning of berries in various parts of the country in order to eliminate unsuitable fruit.

Of peculiar interest to some of you is the work of the Bureau in its study of pie fillers. We hope ultimately to formulate a standard or definition for such fillers, and to require a labeling that will enable the baker to know better than he can know at present just what he is getting in the way of a filler. Under the general requirements of the food and drugs act, all statements appearing on the label of such products must be true. The Bureau has taken action against so-called lemon pie fillers which consist of cornstarch, citric acid, and a yellow coal tar dye. We have insisted that such preparations be called "imitation" and labeled to show their essential ingredients. The Bureau holds that the proper filler for lemon pie should contain egg yolk or whole egg with lemon juice, with or without lemon peel, and should not be colored so as to conceal inferiority.

Certificates on Color.

We are endeavoring also to see that the shortening and flavors which are used extensively by bakers are free from adulteration and misbranding. You are perhaps in a better position than we are to know what improvement has been made in these products during the last 15 years, for which I think the Bureau can claim a large share of the credit.

In order that bakers may be sure that

the coloring material they use is free from harmful ingredients and meets all the requirements of the Federal food and drugs act, the Bureau of Chemistry issues certificates to manufacturers of food colors under certain conditions. Manufacturers submit to the Bureau of Chemistry samples of various batches of dyes, accompanied by a statement showing exactly how they were made. If they prove to be entirely free from harmful impurities and otherwise meet the requirements of the law, the Department of Agriculture issues a certificate permitting the manufacturer to sell such batches as certified dyes. Many manufacturers of food products buy only certified dyes, thus making sure that the dyes they use will meet all requirements of the food and drugs act, and that the foods they sell will contain no harmful ingredients added in the color.

Our work on dried fruits illustrates how both the research activities and the regulatory work of the Bureau of Chemistry may be of interest to the baking industry. An investigation of the best methods of drying fruits and vegetables has shown that it is practicable by improved methods of dehydration to produce dried fruits superior in every way to the fruits dried by the old hit-or-miss process. For instance, our specialists have shown that it is practicable, under right conditions of temperature, humidity, and air currents, using proper methods of preparing, handling and processing, to make dried apples that are almost, if not quite, as palatable as the fresh fruit.

When cooked or baked in pies the apples prepared by this process resemble in every way fresh apples similarly cooked and baked. Instead of having a dark brown color characteristic of apples dried in the old-fashioned way, they have the characteristic color of the fresh apple.

The investigational work of the bureau has resulted in the development of improved processes for the dehydration of many fruits and vegetables.

In the enforcement of the Federal food and drugs act, we have given attention to the sanitary conditions under which fruit is dried. The law also requires that such fruit be really dried, that is, that only a normal percentage of moisture shall remain in it. Excessive moisture in dried fruit increases the weight unduly and therefore the cost to the buyer and also injures its keeping quality. We have seized many shipments of dried fruit because it contained too much moisture. As the result of our activities in this direction, the average moisture content of the dried fruit in the market is lower than it would otherwise be.

Unfair Competition.

The enforcement of the Federal food and drugs act protects the baker against some forms of unfair competition, particularly in the matter of short weight. The Federal law does not require that a package shall be of any specific size. Whatever the size of the package, with the exception of those containing less than one-half ounce, however, the quantity of contents must be plainly and conspicuously stated. Loaves of bread, if in package form, that is, wrapped, may be, so far as the Federal law is concerned, of any size, but their correct weight must be stated. It is interesting to compare this with some of the early colonial regulations regarding bread, a few of which I have cited.

The Federal food and drugs act also prohibits all false and misleading statements on the labels of food packages. Therefore, if competitors falsely label their products which are shipped within the jurisdiction of the Federal food and drugs act, you can protect yourself and

perform a service to consumers and aid in the enforcement of the law by calling the attention of the Bureau of the misbranding. In this connection your attention is called to the fact that the Federal food and drugs act does not apply to false advertising in newspapers, magazines, posters, and the like. It applies only to the labeling or to statements which accompany the package of food.

The Bureau of Chemistry, in cooperation with the Joint Committee on Definitions and Standards, is formulating standards and definitions for various bakery products and for some of the materials used by bakers. It is believed that these definitions and standards will tend to promote fair dealing and to reduce unfair competition, and especially to give the baker more exact knowledge of what he may expect to receive when buying a standardized product.

As a factor in promoting public confidence in the purity and wholesomeness of food, the food and drugs act performs a great service to bakers and to other food manufacturers. Every food manufacturer knows that if the public doubts the wholesomeness and purity of a food product, the sale of that product will decrease. The public most readily buys products in which it has confidence. The fact that bakery products and other food products are controlled by Federal, State and Municipal laws is a potent factor in inspiring the confidence of the public in the purity and wholesomeness of these products.

From the first men of vision in the food trades have seen that effective food laws would be of great benefit to the industry as well as to the consuming public, and they have assisted in securing the enactment of such laws. What these leaders saw from the beginning many others have

come to see through observation of the result of the operation of food laws. Today we expect cooperation from all forward-looking men in the food industries and their sympathetic support of constructive research work to improve conditions in the various food industries. We count on their assistance in making the enforcement of the Federal food and drugs act practical, effective and of benefit both to the food industry as a whole and to the consuming public.

Does Bread Change Life?

THE Institute of Social and Religious Research, which I represent, is seeking to study the field of social sciences to determine what changes are coming in small city life during the critical period since the early eighties. We are stressing changes in home life, such as the introduction of labor saving devices, changes in methods and quantity of grocery buying, and of obtaining baked products.

Can your Institute of Baking direct me to any studies of the increase in the amount of bakers' bread consumed in cities, particularly middle-western cities like Muncie, of the 25 to 60 thousand group? One of the obvious changes to which several references are made in Baking Technology refers to the release of housewives from drudgery through the decline of home baking.

—J. B. Flournoy,
270 Seventh Avenue, New York City.

Please accept my thanks for Baking Technology. Each number, as I finish it, is passed on to someone else, usually a baker, and we all like it for its quality of humanness, freshness, and scientific thoroughness.

—Emma E. Crandal, Brooklyn, New York.

Showing it Forth

THE Swander Baking Co., of South Dakota, wanted to gain complete control over dough fermentation to bring an end to "wild" variations in its bread flavors and texture. It sent John B. Eilers to the American Institute to learn the science of baking, and then put him in charge of bakery production as a "service man."

After a little while at this task Mr. Eilers was able to show that the experiment had not been attempted in vain.

"Our bread must be good," advertised the Swander company in quarter-page newspaper advertisements, "for Swander's is the only bakery in South Dakota which has a scientifically trained service man on the job. Besides using the very best of materials, the most modern machinery and the newest formulas, we have a trained baking expert whose sole duty is to take the guess work out of our baking. In making our bread we are carrying out an ideal—a desire to make bread so pure, so clean, so unquestionably good that we can be proud of it as an artist might be of a masterpiece he has created."

A Protest

Iowa papers are rejoicing because some housewives in a small town in a remote corner of that state got up an "old fashioned baking contest." What made it news was that it was the first one held in many, many years. The editors complained that the movies had made the women more favorable to "can opening contests" in their hurry to get rapid-fire meals for their men folk. The editors try to call the women back to the kitchen,—but their dolorous tones show that they have scored something far from a success.

Books for the Baking Laboratory

SIEBEL'S MANUAL FOR BAKERS AND MILLERS. Second edition, enlarged and revised. Published by the Siebel Institute of Technology, Chicago. 192 pages and 10 plates.

The book is, as the name implies, a manual or ready reference book. It consists of fourteen chapters and an Appendix. Two of the fourteen chapters deal with milling and flour.

The book is divided into three parts. The first part is a discourse on modern milling and baking technology and baking materials. This part includes five chapters and gives a brief discussion of wheat types and the general operations carried on in a mill. Methods of flour analysis, baking test, and laboratory equipment are described. The baking materials discussed are flour, water, sugars, salt, yeast, shortenings, bread improvers, yeast foods, malt extract, and milks. A chapter on baking technology which describes baking operations is also included in this part.

The second part is called "Records and Formulas." This consists of two chapters and points out the value of keeping shop records. A table showing formulas for various kinds of bread, rolls, and cakes, completes this part.

The third part is "Scientific and Technical Data." This part is composed of seven chapters and gives general information about physics, chemistry, microscopy, refrigeration, electricity, and calculations.

The appendix consists of various physical tables, a dictionary of technical terms, and ten plates chiefly bearing on microscopy.

The material is well arranged and the complete index makes it very easy to locate any desired information quickly. The information is brief and concise, and the book is remarkably free from typographical errors. This book will make a valuable addition to any bakery library as a reference book.

If the chapters on baking technology and shop records were enlarged in order to give more detailed information to readers with little or no baking experience the value of the book would be enhanced. For readers with bakery training this book should be a great help in explaining the reasons for the various operations in the shop.

V. E. M.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

The physico-chemical properties of strong and weak flours. VIII. Effect of yeast fermentation on imbibitional properties of glutenin. P. F. Sharp and R. A. Gortner. *Cereal Chem.* 1, 29-37 (1924); cf. *C. A.* 18, 1535. Yeast produces a marked change in the imbibitional properties of the glutenin as fermentation progresses. The viscosity of a suspension prepd. from the dough, with electrolytes removed, increases to a max. as fermentation progresses. Viscosity of such a suspension treated with lactic acid markedly increases as fermentation progresses. Malt exts. greatly decreases the effects of yeast fermentation as given. As fermentation progresses it becomes impossible to wash gluten from the dough with distd. water, although gluten can still be washed from the dough if sufficient electrolytes are present.

Ruth Buchanan.

Industrial flavors for the baking trade. Melvin De Groote, *Spice Mill* 47, 586-92 (1924). Manuf. of flavors for the baking trade requires specialized procedure. The main points for attention in making vanilla, orange and lemon flavors are given.

C. W. Trigg.

Vitamins, health and the daily diet. J. W. Read and S. Palmer. *Arkansas Agr. Expt. Sta. Bull.* 184, 5-64 (1923). A general discussion of the relative vitamin and protein values of the more common foods, other dietary factors, and considerations involved in adequate nutrition under various conditions. Tabular data are included.

P. R. Dawson.

The chemistry of flour and bread making. R. Harcourt. *Can. Chem. Met.* 8, 82-5 (1924). Briefly discussed the following topics: statistics on cereal consumption; why wheat is used so largely; factors affecting quality of wheat; milling and grading of flour; aging and bleaching of flour; what is the best bread-making flour; importance of fermentation control in bread making; chem. changes in bread making; bread in the diet; and the relative value of white and Graham bread.

J. A. K.

Glycerol as an aid in ashing flour. Raymond Hertwig and L. H. Bailey. *Cereal Chem.* 1, 82 (1924).—Five grams of flour are mixed with 10cc. of glycerol-alcohol solution made from equal volumes of each. After burning off the alcohol the sample is burned in the muffle at 575°. The glycerol shortens the time of ashing to 1½ to 2 hours. A. O. A. C. method requires 5 hours.

Ruth Buchanan.

Sizes of pores in baked bread. K. Mohs. *Cereal Chem.* 1, 149-51 (1924).—Ten photographs are given showing various sizes of pores; No. 1 gives the largest and No. 10 the smallest. Anyone can obtain an exact picture of the general appearance of the pores by inspection of corresponding Nos. on the above pictures, which are supposed to be used as a standard.

Ruth Buchanan.

Determination of moisture in wheat flour. I. Harry Snyder and Betty Sullivan. *Ind. Eng. Chem.* 16, 741-4 (1924).—In 28 moisture tests of flour, air-oven drying for 5 hours at 105° gave 1.43% more moisture than 5 hours' water-oven drying. In 27 moisture tests, vacuum-oven drying at 100°, 600 to 750 mm. vacuum, gave 1.87% more moisture than water-oven drying. At a few degrees above the boiling point of water, an additional loss of weight in drying occurs due to the ways in which water is present in flour.

L. W. Riggs.

Contribution to the understanding of the baking power of flours. A. Heiduschka and E. Fichte. *Kolloid-Z.* 32, 193-5 (1923).—Luers and Ostwald (C. A. 14, 1167) found that the addition of lactic acid to a 7% rye flour dough decreased the viscosity while it increased that of dough of wheat flour. H. and F. find that with a 16.5% dough of rye flour, lactic acid and H₂SO₄ increase the viscosity notably, tartaric and acetic acids are without effect, NaCl, Na₂SO₄ and K₂HPO₄ decrease the viscosity markedly, KI decreases it slightly, KCIO₃ raises it, and NH₄Cl, CuSO₄ and KBr have very little effect. The greater the viscosity of the dough the larger the finished loaf of bread.

F. L. Browne.

Viscosity and baking ability. K. Mohs. *Chem.-Ztg.* 47, 889-91 (1923).—The paper by Heiduschka and Fichte (preceding abstract) is criticized from the point of view of the small amounts taken for the baking tests as well as their conclusions. A table is given showing the effects of persulfate and the Ca

compound "Humphrite" on loaf-volume. The persulfate gave a 20% increase in volume whereas a combination of the persulfate and "Humphrite" gave a 30% increase. The smallest increase was 15%. The size of pores is a good index to the baking power of a flour, size of pore marked 8 always giving the best product. The relation of the dry to the moist gluten remains unchanged so that even these relative numbers are of no value in the evaluation of flours. Viscosity measurements give no indication of improved baking qualities. The addition of salts and acids up to a concentration of 0.0085 N gives no change in viscosity number. Viscosity numbers vary with the degree of milling of the flour. Domestic flours with a high degree of milling give lower viscosity numbers than foreign flours with the same degree of milling. Conclusion: Viscosity measurements are of no value in predicting baking ability of a flour.

J. A. Kennedy.

Wheat and flour studies. II. Aging. I. The change in hydrogen-ion concentration of wheat and mill products with age. P. F. Sharp. *Cereal Chem.* 1, 117-31 (1924).—High grade flour from normal wheat has a higher H-ion concentration than either the wheat or its other mill products. The H-ion concentration, of wheat, flour and mill products increases with age under favorable conditions of temperature and moisture, and that of unground wheat. Results indicate that the foregoing statements apply to immature frosted wheat and its mill products. In this case the increase in H-ion concentration seems to be faster than that for normal wheat.

Ruth Buchanan.

PATENTS

Shortening for use in bakery products. A. J. Clark. U. S. 1,491,830, Apr. 22. A shortening for preserving cakes, biscuits and similar bakery products in fresh condition for some time due to its hygroscopic properties is formed of edible fats and oils and a mucilaginous compn. contg. hemicellulose, e. g., a mucilage derived from Chondrus crispus or seeds of *Ceratonia siliqua*.

Treating flour with oxygen compounds. T. Kroeber and Oelwerke Noury & Van der Lande Ges. Brit. 213, 268, March 19, 1923. Benzoyl peroxide or similar compounds of high O content are finely divided, wet or dry, and then admixed with flour to improve its properties.

The Lore of Bread

THE significance of bread among the world's foods was first brought home to many of us by the wartime wheat shortage. We had more or less accepted the truth of the adage that bread is the staff of life, we had learned in our nutrition classes that cereals are, on the whole, the most nearly complete, economical, and widely used of the staple foodstuffs, and that wheat was one of the principal items of the world's commerce. In this country even the war did not show us what it means to lack for daily bread of some kind, but those of us who tried to follow the precepts of the food conservation campaign, especially those of us who helped to teach them, had our eyes opened to the fact that bread is still literally the staff of life for millions of the world's inhabitants. We also gradually realized that among people used to one kind of bread changing to another is a hardship which strikes so far into their daily lives that it may seriously interfere with their morale; that bread, which in one country is considered delicious may not be acceptable where it is unfamiliar, no matter how nutritious science may prove it to be; that if it is the custom of a country to buy bread ready baked, the housekeepers have neither the equipment nor the skill to make it at home; that only breads made from flours rich in gluten and raised with yeast are satisfactory.

The fascinating models in the Metropolitan Museum, which show everyday Egyptian practices of five thousand years ago, include grinding grain and baking bread; loaves of bread have been found in the Egyptian tombs and the ruins of Pompeii; and the unleavened bread of the Jewish Passover still testifies to the early prevalence of yeast-raised loaves.

Literature tells the same story. The trenchers which appear in every description of medieval meals were originally slices of hard bread, to be eaten along with the meat or other food which was served on them. Up to modern times fine white loaves are spoken of as a mark of wealth and luxury and contemporary novels of rural Europe show that idea still prevailing in many regions.

Proverbs in which bread plays a part are so common that a special collection has been made of them by J. H. Macadam and published in the *British Baker*. The *Hotel Monthly*, appreciating their significance and charming quaintness, has reprinted some of them for American readers in its issues for June and August 1924. The preference for wheat shows in "Do not look for better bread than wheat" or in "Millet bread is not worth talking about;" and broadmindedness in "They also bake good bread in foreign lands." The virtue of thrift is extolled by the expressions "A crust for declining years," and "Sour wine and old bacon and rye bread keep a house rich;" and its lack by "Mealtime does not come punctually when there is no bread." There is a suggestion of oriental hospitality in "Bread and salt blush to be paid" and of friendliness in "The loaf of one house and the loaf of another are brother." Health campaigns might adopt "It is better to spend money for bread than for medicine," and, as a warning against dreary mealtime conversations, "Woes are not good with bread." Not a little wisdom is tucked into "Other people's bread tastes better than your own," "When a human being is born a bit of bread is ready for him," and "If fools ate no bread corn would be cheap."

—Editorial Jour. Home Economics, Oct., 1924.

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The Larger Co-operation

EVERYONE who helped to labor through the World War knows that American generals had to command units much larger than they had ever had to vision and to organize before. Americans know that the world as a whole is getting smaller by the minute, and units of it growing larger by the minute. The fine and successful unit of yesterday becomes the out-of-date and useless unit of today. Men who un-

derstand this voted at Atlantic City during our National Convention in September to ask the American Bakers Association Board of Governors to call a general conference in February at which all

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never before thought of their work as part of a bigger work, and their hope was that the conference might so shape itself that they could go away as an expeditionary force with each corps tied in

phases of the task of telling bread's story to the people should be taken up. What was it these men visioned? It was nothing more nor less than a super-organizing of the resources of the American food industries so that they can function in the future as a great expeditionary force. They wanted to march down to this February conference in battalions, regiments, divisions, and corps—men who had

and liaisoned up with its fellows so that all might shoot at the same target at once.

Are you planning to come to this February conference? The details will be sent out as to the exact date after the November meeting of the American Association's Board of Governors. This article is written in the hope that you are thinking along the line of things to be accomplished, and the part you can play when the time comes.

Al Taggart, of Indianapolis, is one of those who are thinking about it. He is convinced that the old ways of older days no longer apply and that the baking industry must clarify, codify and consolidate all existing knowledge of how to gain good will for baked goods among consumers of baked goods. And then must educate all who participate in telling bread's story so that the telling of it will "register" in the most effective way.

And there are others who see that men of the dairy industry must so tell milk's story that it will be told in harmony with bread's story, and that both stories must be told together in any given territory to get a greater result than if either were told alone, minus all thought of co-operation.

Willing Allies

Milk men and bread men, both interested in performing the same kind of work for their respective industries will be at this conference. So will syrup and jam men. They realize that syrups and jams sell for use on bread, and as bread sells, so do they sell. They know that in educating the people as to bread's best place in the diet, all who participate affect their products. They wish to know how to make their paragraphs count in the larger story.

Butter people know that the more bread sold, the more butter is used as a

spread, so that they must no longer fight their cause alone. Their knife-full of effort must be harmonized with all other similar effort and be attached to it.

The meat people, just so, know that their fork-full of meat copy must be part of the larger effort, if they are to win in as large a degree as is possible. They will be at the conference, ready to abandon years of "going it alone," in favor of a new era of urging "bread and meat for health complete."

Prefatory to the coming conference, a mood of working together has pervaded over 30 industries allied to bread. They have worked in the hope that they were doing the right thing, and in the hope that playing the role of their brother's keeper would in the end redound to their advantage. But they could not be sure. They have worked for others, hoping that the others would see what they were doing and respond in kind.

Now it is proposed to bring each factor face to face with his fellows and enable all to mutually understand one another. Mr. Taggart wants to get more light on the question of merchandising bread and sending its story ahead of the bakery delivery basket. Others want to get more light on national advertising campaigns. The national food advertisers can so time their campaigns, for instance, that word can be sent to bakers affected enough in advance for them to add local advertising as a foot-note to the national advertising, and focus the national message upon themselves in their own sales territory.

And one national campaign can be made to follow another on a time schedule so that no two will simultaneously distract public attention from a common focus. Spokesmen for many such groups will be at this conference, ready to come to an understanding for educational publicity drives. A Trade Promotion Department of the American Institute may

be permanently set up to carry on this line of endeavor.

There are many fields in which the main stream of such effort may flow to fertilize them. For instance, there are the young men of the American Institute's School of Baking. Some of these young men become absorbed in production problems after leaving the school. They will not especially care about this conference. But others of them graduate, in small plants, to the position of plant manager, in charge of all departments of bakery activities. They have to take over the public relations of the bakery and to build up morale in the community for the plant's baked goods. Such school graduates want to know the things to be brought to a focus at this conference.

It is proposed, therefore, that a special short course in bakery public relations be added to the School of Baking. A course has been sketched out to fill a two-weeks' period, to be given as a supplementary course to the general course in bakery production. Shall it be installed? Is there a demand for it?

A New School Course

Men at the Institute cannot know these things by methods of necromancy and guess work. They must first float the idea out to the industry at large and then must find what the reaction is. Just so the idea of a school was sent out in the first place. On the first reaction many bakers were opposed to helping pay for it—"Let those pay that get the benefit," they said. Only eight students applied, and it was obviously impossible to maintain a faculty for such a small number. But the eight went out into the baking world. Stories of what they could accomplish got abroad. Eighteen responded at the next call, and by the third call the school was overflowing its capacity. It is now being booked full up months ahead of the opening date for each class.

Just so at this time the idea of a short course following the regular course for those who wish to take up a bakery's public relations problems, is being floated out to the industry. Those responsible will await anxiously the reaction at the time of this conference. The American Institute has developed through this process of adventuring some eight or ten lines of activity. These survive out of thirty or forty that were advocated and tried out, only to find that the industry was not yet ready to support them or was positively set against them.

Representative Views

Here are some letters that show the spirit of co-operation awaiting organization from associated lines:

From an officer of the Michigan Dairy Association,—R. P. Fray:

Our two great fundamental industries are allowing to pass a splendid opportunity when they overlook the importance of linking together these two articles of human food so naturally related. Is not the time ripe to take some systematic and businesslike step to link the butter and bread industries in a general advertising campaign?

From a syrup manufacturer,—G. A. Russell of the Bliss Syrup Refining Co.:

We would like to follow a national bread advertising campaign with one on our jams and jellies. Both together would draw more attention than both run singly and apart.

From a flour mill's advertising department,—J. A. Quint of the Washburn Crosby Co.:

I have heard with interest of the plan to bring together the leaders of national food advertising campaigns so that they may tie their campaigns up in the way to bring the most benefit for all. This movement is very much to the point. I hope the time has come when big national advertisers will be willing to sit down together, go over advertising plans for the year ahead, and see what can be done by each, with the other's ideas in mind, to make the total effect stronger.

Thus the letters coming in at the Institute tell their own story of a willingness

to act. A strange feature of these letters is that in many ways the American Institute's activities seem better understood by outsiders than by bakers themselves, and seem better responded to from the outside than from within.

The Grocer's Interest

The burden of carrying on still falls heavily on the heads of hundreds where thousands ought to be sharing the load to make it go to the best advantage. And among these groups of outside industries that understand what is called for the grocers must be accorded a high place. Grocers have long complained that bakers have let chain store conditions grow among them without helping them, that in the end will need adjustment to protect both groups. Grocers have urged bakers to help by making grocery service for bread as convenient as possible and as effective as possible.

One baker has seen the larger vision of co-operation. He has marked his bread "Monday Bread" or "Tuesday Bread" and so on, on the wrapper to build confidence from the housewife that she is always getting fresh bread. He takes no chances with stale loaves "given a ride" by drivers from one grocer to another.

Similarly, Julian Livingston, in Chicago, has furnished grocers with thousands of window cards, 90 per cent of the space of which is prepared to help the grocer sell foods that go with bread, and only 10 per cent of which advertise Livingston's bread. At Hallowe'en time, for instance, timely window cards showing a witch astride the conventional broom in a journey over the moon, devoted the rest of their space to fine sand-"witches," designed by Livingston.

They called attention to the fact that the grocer carried, for the making of such sandwiches, jellied chicken, India relish, figs, deviled ham, walnut meats, cream

cheese, Chili sauce, raisins, orange marmalade, quince jelly, dates, and apple jellies.

Grocers' spokesmen are expected at this conference, and are expected to outline the kind of co-operation that can best be worked out between baker and grocer. H. C. Balsiger, of the Better Grocers' Bureau, is the natural liaison officer in this field, and he is one of those most interested in the proposed conference. When it is over it is believed that many lines of endeavor that now are wasteful and competitive will become co-operative and cumulatively productive.

Dr. Stephen Babcock

UP in Madison, Wisconsin, on a recent visit I found a grand old man to whom it happens that the world is perhaps more deeply indebted than to any other chemist now living.

I called to see him, expecting to find an aged and feeble old man, and wondered how he would stand out in contrast to the Dr. Babcock I knew some twenty years ago when it was my privilege to serve as his assistant at the University of Wisconsin. Instead of finding a man bent with age, I found him, except for the whitening of his hair, the same Dr. Babcock of years ago. Time had indeed dealt gently with him. If the keenness of his eyes or the vigor of his handclasp left any doubt of that, it was promptly dispelled when, after lunch, he drove me around the city in his car and the opportunity for a delightful conversation was presented. Yes, it was the same modest, lovable Babcock who more than thirty years ago gave freely to the world the test that will connect his name forever with the dairy industry.

Although Dr. Stephen M. Babcock is best known as the inventor of the Babcock Test, it is but one of many of his

contributions to the dairy industry. His work on the curing of cheese resulted in improved methods which are used all over the world. In fact, there is not a phase of the whole industry that has not been advanced, directly or indirectly, through the genius of Dr. Babcock. In the dark ages of dairying prior to the advent of the Babcock test, there was no way of testing milk except by the expensive and tedious laboratory method. Dr. Babcock placed in the hands of the farmer and creamery man a simple and rapid test that they themselves could quickly learn to use.

Pages could be written on what this test has done for the dairy industry. As one writer so aptly puts it, "A dairyman today without a Babcock test is like a mariner without a compass." It lifted dairying out of darkness and is responsible more than any other one thing for making it what it is today, America's leading industry. The value of this one invention could not be estimated.

It is given to few men in a peaceful and happy old age to look back in retrospect at a great modern industry and have the right to feel that they are largely responsible for its development. Dr. Babcock has lived so long after the acceptance of his contributions that he has been enabled to see the full returns of his labors: the labors that have made modern dairying possible.

Dr. Babcock could hardly have failed to foresee that his test had great monetary value, yet he chose to give it freely to the world, though a patent right would have made him very wealthy. Although he has not been rewarded in a pecuniary way, he has received honors such as have few scientists. The State of Wisconsin through its legislature showed its appreciation by presenting him a medal. The dairymen of faraway New Zealand sent him an appropriate testimonial for what

he had done for them, and the dairymen of the Province of New South Wales and Victoria did likewise. The Babcock test received the highest honors at both the St. Louis and Paris Expositions.

In 1913 the University of Wisconsin made him Professor Emeritus. This gave him leisure to carry out a line of investigation that had long interested him. At the age of 81 Dr. Babcock is hale and hearty. While no longer taking an active part in the affairs of the University, he still has an office and laboratory in the Department of Agricultural Chemistry, where his kindly council is highly valued.

As members of another great industry, we, too, owe homage to Dr. Babcock, for in our increasing use of milk in bread making, we are allying ourselves to the great industry he had so much to do with developing. In still another way are we indebted to him. It was while in Dr. Babcock's department, carrying out work begun by him and following his suggestions that Dr. McCollum brought out the first of his brilliant discoveries in vitamins that have been so helpful to us in raising the standard of bread. —Roscoe H. Shaw.

Mayor Jago Again

Professor Jago has been asked and has consented to act as Mayor of Hove for the third year in succession. The honor of being Mayor, as I informed you some time ago, was postponed because of prior claims on the time of our mutual and esteemed friend, one of such claims being a visit to the United States. The Corporation of Hove seems, as a consequence, to have concluded that something unusual should be done about it, and the Mayor will continue for a third year. Not the least interesting part of my information is that Mrs. Jago has been a great success as Mayoress.

—James Meikle in "Bakers' Helper."

BAKING TECHNOLOGY

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I. K. RUSSELL, Editor

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We Work Together

To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.

Whose Responsibility?

TWO months in the chair have very materially changed my ideas as to the importance of any one individual to the industry. When I was first confronted with what had really happened and when I recovered from a somewhat dazed condition from the shock, I am frank to admit that I was somewhat appalled by the magnitude of the work ahead; I wondered if it wasn't too much to expect from one person. But, two months have done wonders; no longer am I afraid of what is going to happen. The spontaneous, unsolicited offer of support from the Governors of American Bakers Association, the offer of help from bakers all over the country, the willingness to help from our allied brothers, and a study of the true working conditions at Chicago, have convinced me that it is not my responsibility and that I am necessary only as an agent to help carry on the work already started.

No one individual can greatly affect one way or another the momentum of the work

now going on for the industry. I am convinced it is not the work of one year or a few years; twenty-seven years ago, when the Association was formed by our predecessors (who knew not how well they build) the real foundation was laid. And, in the years gone by not one has passed but that a seed was planted which has or will result in the advancement of our industry.

Therefore, I am going to be satisfied this year if I can lend my support to the guidance of the industry in a cautious, conservative business administration, in the hope that during this time something may be produced that will not reflect discredit to the Association, but better, that may and can be used with benefit to the industry in the years that are to follow.

LEWIS F. BOLSER.

The Pull Together

ONE of the beauties of organizing an industry so that it can take its place in the great family of American industries, is that, when organized as a whole, the literature of its work begins to emerge, also the poetry and the art.

There has recently come to a conclusion, in a death, one of the noble friendships of our world. Around this friendship a drama might be written rivaling that of Damon and Pythias, the famed friends of History.

Dent Harrison, in Canada, was a little crumpet baker, whose plant was a single small room, and whose materials were a sack of oat meal, a sack of flour, and a little salt. He rode his own wagon to sell the crumpets he manufactured. Into his life came Roberts—friend and companion and dreamer of dreams about about big ovens.

When he could ill afford it Dent Harrison, out of friendship contracted for an oven costing twenty-five times as much as the largest one he thought he needed. The

dreamer friend kept dreaming as this oven raised Harrison's output to 2,000 loaves per week. He proposed an oven that traveled. It was built six feet wide by fifty in length. It was soon running to its capacity of 3,000 loaves a night. He let his friend Roberts build others and greater ones and all the World came to see them, so that they traveled to all the world and now bake bread, even for the Japanese army.

There were tears in Dent Harrison's eyes as he told of his debt to his friend to the present writer—in October. No weight of sorrow then to bring them out. But in a month in heart-broken words Dent Harrison wrote that his friend was dying—in his arms—and since he had given his life to the baking industry, he appreciated words of final greeting from bakers, which were to him "stepping stones to Heaven."

Before the first could reach him after his fatal illness he was dead. Here, in Roberts, was a man whose inventions were as revolutionary in baking as Eli Whitney's were in the textile industry and Babcock's in dairying. When he passed away the friend who had been first to utilize his genius was selling 250,000 pounds of bread and over twenty-five tons of cake per week, all put through those traveling ovens. And two lives had been lighted by a great and noble friendship.

Where could more beauty lie in any human experience?

Away back when—

WHEN cigarette makers pulled apart and fought one another to the death for trade five billion cigarettes made the total American output per year. They decided to work together to upbuild their industry in the eyes of the Nation. Seizing the available approach—which happened to be army lads, they hoisted sales to nineteen billion per year.

The laundrymen washed but few American clothes and had a reputation for losing clothes and mistreating them, and giving a hard answer to the complaining housewife. They made their National organization flower with its slogan: visit your neighborhood laundry. And they made the laundries fit the visit. And dropped harsh words to complaining housewives. Result? They now are entrusted with five fold the amount of service they formerly rendered the housewife.

The builders of closed-body cars formerly fought one another. Now they join to "sell the idea of closed bodies," and the literature of Motordom is filled with praise of the glass inclosure for sleety days. Result? Well, watch for yourself how the touring car dwindles in vogue.

Behind the baker pushes the raisin grower with the resources of the whole raisin crop consolidated in a drive to glorify raisins when baked into loaves of bread and pies and cakes. Aaron Sapiro, famous advocate of cooperation among farmers, points out in Radio talks that the concentrated push of raisin growers behind bakers' bread has increased their merchandised output many thousand of tons. They always seek new outlets; the tootsie roll is the last to succumb.

So far, so good. But where are the wheat farmers with the merchandisers of their wheat in the form in which it is eaten? They are next up in line to catch the idea and trade their hammer for a banner and drum, and gestures of cooperation.

Getting Ready

DO not forget, if you have any thought for that part of your baking work that has to do with winning and holding good will from the public, that a conference on this theme will occur at the American Institute in February.

White Bread Made With Milk

It is Found to be Gaining a Larger Place in the Diet of the American Home

By WALTER H. EDDY

Laboratory of Physiological Chemistry, Teachers College, Columbia University

IN this article, published in the August, 1924, number of the *Journal of Home Economics*, Dr. Eddy confirms our ideas as to the value of bread made with milk. He also shows that skim milk may be used instead of whole milk in bread making, the butter fat spread upon the bread before it is eaten adequately supplying the necessary fat and vitamin A.

Dr. Eddy's observation that "a few bakers use milk and more would do so if consumers demanded it and were willing to meet the added cost" is, however, not in line with modern practice. Five years ago he might have made this statement. Today ninety percent of bakers' bread is made with milk and bread consumers are willingly paying its price. It is also apparent, from the hundreds of bread formulas which are submitted to our Service Laboratories, that the amount of milk used is constantly increasing.

All the criticism of white bread as an inadequate and devitalized food is, of course, made impotent by Dr. Eddy's scientific studies of the nutritive value of milk bread. The baking industry and every bread eater is under an obligation to spread the fact that white bread, made with milk, contains a high calcium content, balanced proteins and sufficient vitamins to make it the best and indeed almost a complete food.

The preëminence of bread in the diet of western nations is recognized as well-justified by dietetic and economic considerations. At least in the United States, however, there are certain factors involved which suggest the need of caution if the consumption of bread is to be in-

creased for any reason, possibly even if it is to be held at the present level. After exhaustive analysis of the constituents of the American dietary, Sherman has pointed out that:

American dietaries, both urban and rural, are more likely to be deficient in calcium than in any other individual element because they tend to consist too largely of the products of seeds together with meats, fats and sugar with too small proportion of milk and vegetables. . . . It has long been known, but perhaps never sufficiently emphasized, that the milch cow returns for human consumption a much larger proportion of the food value of what she eats than does the animal that is raised for slaughter. This is strikingly true not only of the previously recognized factors of food value but also, and apparently to an even larger extent, of the so-called vitamins."

In this country the preference for bread made from white flour is so general and well-established that there is little likelihood that breads made from whole wheat or other flours and meals will be generally substituted for white bread; and since such bread contains less mineral matter and vitamins than a whole-grain product, to increase its proportionate use without making other modifications in the diet would increase the chances of calcium and vitamin deficiency.

A simple modification which would lessen this danger would be to add milk in mixing the dough. Such addition would have the further advantage of increasing the supply of adequate protein and from an economical source. Many housekeepers

do this already, preferring the quality of such bread to that mixed with water. A few bakers also use milk and more would probably do so if consumers demanded it and were willing to meet the added cost.

From the baker's point of view the question is not simply that of buying milk and substituting it for water in his usual formula. He must be sure how much and what kind of milk it is practicable to use in making a bread whose quality and price will satisfy his customers. If he puts milk in his bread he should not be expected to compete in

probably made with little or no milk. The ingredients of the experimental breads are shown in the accompanying table where for convenience all values are expressed in terms of 100 units of flour.

E-1 and E-2 are water breads differing only in the amount of yeast used. E-3 and E-4 are fresh milk breads, the formula for E-3 resembling those used by bakers for milk breads, and that for E-4 being the standard for home-made bread worked out by the cookery department of Teachers College. E-5 differs from E-4 only by the addition of enough whole-milk

Ingredients Used per 100 Pounds of Flour in Experimental Breads

Kind of Bread	Water	Milk			Yeast	Sugar	Shortening			Salt	Malt Extract
		Whole, Fresh	Whole, Powdered	Skim, Powdered			Butter	Lard	Vegetable Fat		
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
E-1	62	....	....	....	2.5	3.5	....	....	....	1.75	....
E-2	62	....	....	....	5.0	3.5	....	....	....	1.75	....
E-3 .....	....	64	....	....	5.0	1.5	3.0	....	....	1.5	1.5
E-4 .....	....	65	....	....	4.7	3.4	3.4	....	....	0.73	....
E-5 .....	....	65	8	....	4.7	3.4	3.4	....	....	0.73	....
E-6 .....	....*	....	....	6	5.0	1.5	....	....	2.0	1.5	3.0
E-7	65	....	....	16	5.0	3.4	....	3.4	....	1.5	....
E-8	65	....	....	24	5.0	3.4	....	3.4	....	1.5	....

* Water to make medium dough.

price with one who uses only water, and his customers must be persuaded that the increase in food value or attractiveness is worth the added cost.

The experiments here reported were devised with two distinct objects: First, to measure the nutritive value of breads compounded by various formulae and, second, to determine how much milk could be incorporated in the dough consistently with palatability and practical breadmaking.

Two commercial and eight experimental breads were used. The commercial breads, designated C-1 and C-2, were

powder to double the total milk solids in the dough. E-6 is based on E-3, and represents an attempt to introduce milk solids in the cheaper form of skim-milk powder and to reduce costs yet further by the use of vegetable shortening. E-7 and E-8 are similar to E-4 with water and skim-milk powder used in the place of milk, with lard substituted for butter, and with less yeast and more salt.

The nutritive value of the various breads was tested by feeding experiments with white rats of similar ancestry raised on known diets. Before being weighed and fed to the animals, the breads were

dried in an airbath. The rats were allowed water *ad libitum*.

In less than forty days the rats on the commercial breads containing little or no milk and on the water bread E-2 began to decline in growth, whereas those on milk breads were still actively growing. To what is this difference due? Partly to lack of a good protein. Accordingly, in the experiments with breads C-1, C-2, E-2, and E-3, for a part of the experiment, the dried bread was supplemented by 5 per cent of its weight of casein. In the rats fed on breads C-1, C-2, and E-2, the casein restored growth. To test whether protein had been the only lack, 2 per cent of a complete salt mixture was also added. This double supplement proved inadequate for sustained growth and even in the case of E-3 decline began. The death during this period of all the rats on C-2, and of two on E-2, together with the appearance of xerophthalmia in them and also in the animals on C-1, suggested a deficiency in vitamin A. To test this hypothesis, the survivors of the experiments with C-1 and E-2 had their diet supplemented by 5 per cent of butter fat during the period represented between lines c and d. This addition of butter fat turned the growth curves upward toward normal and confirmed the view that these breads lack vitamin A. During the same period the animals receiving E-3 were restored to a diet of bread alone; the result was some improvement in growth and appearance.

From this we drew the following conclusions: First, since the removal of that the presence of milk in this bread had supplied all of these factors necessary; second, since growth was still subnormal and yet no eye disease appeared, vitamin A was probably also sufficiently supplied by the milk to prevent pathologi-

cal change, if not to permit normal growth; and finally, since growth was subnormal, E-3 must still lack something. Was this vitamin B? To test this point, we added 0.1 gm. dried yeast daily, fed separately. The rats on E-3 and C-1 were by this time too old to yield satisfactory evidence of the effect of adding yeast, but by experiments with E-4 and E-5 we were able to reach the conclusion that even a whole milk bread such as E-3 or E-4 is not an adequate source of this dietary factor.

Reviewing these series, we believe breads C-1 and C-2 and the water bread E-2 are inadequate sources of good protein, and of vitamins A and B. The milk breads E-3, E-4 and E-5 appear to supply adequate protein, their principal lack being vitamin B. Since in E-3 and E-4 as much liquid milk was used as the dough would hold, other means must be found to supply this B. The results with E-5 show the use of milk powder as such means. It cannot be assumed that vitamin A is completely adequate in these breads because eye disease did not develop, for often the amount of A present may be adequate to protect from disease and still be inadequate for normal growth or reproduction.

In accord with Osborn and Mendel we have always preferred the practice of feeding the substance to be tested for vitamin B content separately from a basal diet adequate in all other particulars. We attempted this method with our air-dried breads in combinations with the Osborne and Mendel basal diet of purified nutrients. The experiments failed to give conclusive results. In amounts less than 4 gms. daily none of the breads were adequate as a source of vitamin B. Furthermore, since all the animals ate the bread first and the basal diet afterward, many met their calorie requirements before they had consumed enough of the

basal diet to provide for other nutritive needs. To overcome this difficulty two series of experiments were carried out.

The diets of series I consisted of the following mixtures:

Air-dried bread	per cent 85
Casein	5
O & M Salt Mixture	2
Butterfat	5
Dextrin	3

After this mixture had been fed for about 120 days the effect was tried of adding 0.1 gm. of dried yeast per day per rat. From the results obtained breads C-1, C-2, E-2, and E-3 cannot be considered as supplying adequate sources of vitamin B when they constitute 85 per cent of the diet. The evidence is conclusive in the case of breads C-1 and C-2, but less so in breads E-2 and E-3. In the case of E-5 the effect of the yeast addition perhaps leaves doubtful the question of deficiency in vitamin B.

The experiments of series II were therefore made. In these the rats received diets composed of 50 gm. air-dried bread and enough casein, starch, and lard to bring the component parts up to: Protein, 18 per cent, carbohydrate, 54 per cent, and fat, 15 per cent. To each mixture was then added 5 gm. of butter fat, 4 gm. codliver oil, and 4 gm. O. and M. salt mixture.

The results of series II show that when these mixtures were the sole diet not enough vitamin B was provided to meet the requirements of normal growth. The marked superiority of the milk breads over the others is, however, evident, E-5 providing vitamin B nearly sufficient for normal growth. The daily addition of 0.1 gm. dried yeast per rat supplemented the supply of vitamin B in all these breads except C-1, in which case a further daily addition of 0.2 gm. of yeast was required. The figures for food intake in series II can be utilized to fur-

nish a fairly accurate idea of the vitamin B limitations of each of the breads studied. For the purpose of the present paper, however, it suffices to point out that the addition of fresh milk equal in weight to 65 per cent of the flour in the dough increases the vitamin B value of the bread, but that twice this amount of milk solids is possibly still insufficient to supply the B vitamin necessary for normal growth, reproduction, and raising of offspring.

We were now convinced that enough milk could be used in making a palatable bread to supply the adequate nutrient factors with the exception of vitamin B and possibly vitamin A. We were also sure that sufficient vitamin B could not be supplied by use of liquid milk. The addition of 5 per cent of yeast, the largest amount practicable, had proved insufficient for that purpose. Furthermore, we had in E-5 produced a double-milk bread that was very palatable and almost, if not quite, a complete food. Unfortunately, whole milk powder combined with whole milk greatly increased the cost of the product. The question arose how to reduce the cost without losing the necessary food factors. Breads E-6, E-7 and E-8 were made by formulae compounded to solve this problem. In each of these whole milk and whole-milk powder were replaced by water and the less expensive skim-milk powder. By this substitution we hoped, while reducing cost, to retain protein and salt quality, and secure vitamin B adequacy, relying upon the butter eaten on bread in ordinary practice to supply the lack of vitamin A. The ratio of bread to butter adopted in our experiments was based on the results of a series of studies by Dr. Mary Swartz Rose which seemed to indicate that when ordinary bread is eaten and freedom of choice exercised by the consumer, the amount of butter eaten is in the proportion of

one calorie of energy from butter to one from bread. By analysis, 100 grams of air-dried E-3 bread was found to yield 304 calories. The actual calorie value of a gram of butter ranges from 7.8 upward, but in the present case it was assumed to be 9 calories, and 33 gms. of butter, yielding about 307 calories, were added for every 100 gms. of bread in the diet. In the breads with higher milk content the proportion of energy from bread was of course slightly higher than in the others.

Another practical end was gained by substituting water and milk powder for fresh milk; the use of the latter is often not popular with bakers because the varying acidity of the market product makes it difficult to control the fermentation time for the dough and thus deranges the time schedules in the bakery.

The main purpose of this particular series has been, not to produce a complete food, but to demonstrate that the addition of milk to bread adds greatly to the nutritive value of the product. It has also demonstrated that such breads are not only practicable but actually taste better.

In conclusion it seems obvious that, among the present generation at least, the preference for white bread is so well fixed that bread will mean white bread in the diet of the vast majority of Americans, whole wheat, corn, peanut, and other breads being used chiefly to give occasional variety to the diet. Of all possible single supplements to white bread, milk adds the most dietary essentials, and at the same time improves the flavor without destroying the other desirable qualities. Milk bread is both better-tasting bread and more nutritious bread than that mixed with water. Its palatability is an important advantage because taste is a far greater stimulus in creating a demand than any educational propaganda. We believe that the greater use of milk

in bread doughs is a real means to a better nutrition, that its use will create an appetite which will help the baker who is trying to improve his product and to establish better standards. The results of the present experiments are, therefore, offered not only as evidence of what the addition of milk does to bread, but with the hope that they will stimulate the interest of consumers.

Dougherty Entertains

HOW often does a baker, when a visitor comes to his plant, immediately become as fussy as a housewife who has been surprised by visitors with her kitchen apron on? A member of the Institute staff dropped in on a dozen bakers in various Kentucky and Tennessee towns and encountered much apologizing and embarrassment because things "are not just as they should be."

And then came a newspaper telling about the Dougherty plant at Muncie, Indiana. It recited that on Tuesday evening Muncie grocers, restaurateurs, and other purchasers of the Dougherty products were all welcomed at the plant by A. U. Dougherty, proprietor, and treated to an evening "at home."

It is safe to say that anybody is welcome at Mr. Dougherty's plant anytime. This spirit of making the plant fit and keeping it ready for visitors has so far pervaded the industry that it might as well go the rest of the way.

Five years ago laundrymen's conventions were centers of bitter disputes between laundrymen who believed the public should be welcomed and the plants kept in shape to welcome them, and others who believed the laundering processes were essentially disorderly and uninviting, and should be carried on behind locked doors. Now scores of laundry wagons carrying the slogan, "Visit Your Neighborhood Laundry." And the new order pays.

Handling the Dough Divider

How Proper Care Results in Profits and Neglect Runs Quickly to Disaster

By F. C. REICHERT

Of the Taggart Baking Company, Indianapolis, Indiana

The formation of the American Society of Bakery Engineers was one of the important moves towards a better organized and informed industry that marked the year 1924. Under the guidance of its president, Richard Wahl, the most experienced production managers of the Industry are collecting the best available data on every phase of production work. In this article the dough divider is studied from the standpoint of the care it must have to do its work best. The information in this and in all similar lines is collected by the Society as a contribution to the Industry's welfare. Not so long ago such information would have been jealously guarded in each plant because of a fear, now passing, of helping a competitor. The greater enlightenment shown in the policy of giving it out for all is a recognition of the fact that "to sell people on the bread from your plant they must be sold on baker's bread in general—and every quality loaf helps."

THE successful operation of a dough divider, like the successful operation of any other piece of machinery, is dependent upon the care and use it receives. Baking machinery, however, differs from many other types of machinery, in that cleanliness is a prime factor in the operation, and the result of the finished product.

The dough divider is one of the principal machines used in the manufacture of bread, and its efficiency and operation are directly reflected in the finished loaf. There are certain points that must constantly be before us, and be considered in the operation of the dough divider:

1. Cleanliness.
2. Right condition of dough.
3. Lubrication.
4. Speed.
5. Careful operator.
6. Close supervision of foreman.

Cleanliness is the first point to be considered, for without cleanliness indifferent results must be the answer. Most dough dividers are constructed with pockets and plungers. The plungers are adjustable to change the space in the

pocket to deliver the weight loaf desired. As these plungers fit very closely, the four sides of the pockets must be kept at all times perfectly clean so as to allow free action of the plungers. The dough, in passing through the pockets, will form a very fine skin on the walls of the pocket, and this is the most common cause for uneven weight. General cleanliness throughout a bakery makes it much easier to keep the machinery clean, and constant vigilance in keeping clean becomes a habit, and removes the problem of cleanliness from the care of machines.

Correct weight is the determining factor in the efficiency of the dough divider, and to get the correct weight it is of the utmost importance that all parts of the divider are properly lubricated, and especially those parts that come in contact with the dough. All vegetable and animal fats have a tendency to get sticky and gummy—some more than others—and they are therefore not good to use as lubricants on a dough divider. The best lubricant is refined mineral oil, without taste or odor.

Lubrication Features

The lubrication of the dough dividers, or any other machine that comes in contact with the dough, should receive undivided attention, just as we must consider our body to see that we supply ourselves with proper nourishment, for if we do not we soon discover that our body, which is but a complete machine, refuses to function properly. So it is with this piece of machinery, the various parts must be lubricated, must be nourished and kept in working order, so that when they are put to work every part will function properly. When you neglect to feed a machine its daily ration of lubricant the various parts of that machine begin to cry and squeal as if in pain, and just as the human body, when it stops functioning we relieve the pain with medicine, just so with machinery when it becomes "sick" and out of order we resort to lubricating the various parts that are calling out for lack of nourishment, and as a signal of trouble.

As I have said before, the best lubricant for dough dividers, according to food and machinery experts, is high grade water white, tasteless, odorless, edible mineral oil. This character of mineral oil is the best known to bakery science, and these oils have a natural affinity for iron, preventing rust, and will keep the parts of the machinery that are not exposed from gumming, and being odorless and tasteless, no trace of the lubrication is left on the dough as it passes through the machine, and being edible the oil in no way affects the finished product.

Protecting Your Investment

In laying out a definite plan for the use of lubricants on dough dividers, I would say use only enough oil to keep all parts working smoothly, so they perform their work practically and uniformly. Care should be taken to have all oil cups filled and in working condition.

I am confident that if these suggestions are followed there will be less worry, and better results in the finished product, and the money invested in dough dividers and other machinery will earn a better percent, and the machines will last longer.

The condition of the dough has a great deal to do with obtaining the correct weights. Should the dough be too firm it may have a tendency to not fill the pockets perfectly, and therefore the loaves will be uneven. A dough that is too soft will accumulate gas very rapidly, and for this reason will not give even, or satisfactory weights, for some pockets will have more gas than the others, and therefore less weight. A dough of medium firmness is the most satisfactory, and is productive of the best results. Punching the dough before going to the divider will give even better results in accurate weighing.

Speed a Factor

The speed of the dough divider is variable. Dividers are built to give the various speeds required by different shops, and they can be operated from five to twenty discharges per minute. It is not, however, a good policy to run a divider at its highest, or at its lowest speed. Too high a speed will have a tendency to give uneven weight, and ruin the machine in a short time. Too slow a speed will punish the dough, and therefore will show in the finished product. The best speed for ordinary running is between eight to fifteen discharges per minute, and is practical for ordinary conditions, both in shop operation and resulting product.

The careful operation of the dough divider is of greatest importance. The divider is the cash register of the shop, and therefore should be in charge of, and have the constant supervision, of a reliable, intelligent, conscientious operator. He should, at all times, strive to get the

required amount of loaves out of a certain number of pounds of dough, which he receives from the mixing or fermenting room. This, like keeping a ship on its course, takes constant watching, and, more or less, constant adjustments. This operator must have constantly in mind that every loaf should be of a certain weight, and regardless of the fact that he may get what is thought to be the correct number of loaves out of the dough, if these are one ounce or more heavier, or lighter, he has failed to accomplish the proper results. Accuracy of the weight of each loaf is essential.

The dough divider is so important in the manufacture of bread that its care and supervision should not be left alone to the individual operator assigned to this work, but it should be the duty of the foreman in charge to give the dough dividers his personal supervision; checking often the operation of the machine and the weights of the dough as it is being discharged, and being constantly on the look-out for things that may change the weight without changing the adjustment of the machine.

Like any other piece of machinery, the dough divider, to give best results, requires constant care, but unlike all other machinery in the bakery, **the dough divider is the measurer by which the profit or loss in the operation of a shop is determined**, and upon its accuracy in weight, and uniformity in operation, may depend the profit and loss of the business.

A Resolution

It is also recommended by this committee that every member of this State association join the National association. Although the membership fee of the National association might seem rather expensive, yet it has been the experience of

those who are now members that the actual benefits they derive far outweigh the cost of the membership fee.

—From Proceedings, Washington State Bakers' Assn., in convention at Bellingham, Wash.

Bake Better Bread or Go!

Husband's Ultimatum Quoted by Wife in Divorce Case

Special Telegram to Public Ledger.

Spokane, Wash.—“You son of a gun, make better bread or leave!” were the exact words of Henry Sierts in a family row, according to Clara Sierts, who divorced the Spring Valley landowner yesterday.

Mrs. Sierts testified her husband swore at her and often would not speak except “to answer in a real cranky manner.”

—And Peanut Butter

In magazine advertising one of the recent recruits to the practice of picturing bread as the carrier of his product is the Heinz Co. This company's peanut butter is shown, in a recent number of *Good Housekeeping*, as going in luscious baby bites, into the domestic economy of a contented child. The child is eating a slice of bread, peanut-buttered. It is another telling adoption of the John Burns slogan: “Advertise as you eat.”

Awaiting the Dawn

Your Institute is rendering the bakers of the country a great service and I wish we could get a group of bakers together out here such as the group I saw at the Denver convention, but whenever we call a meeting we are lucky if we get half a dozen. We are only a few bakers out here in Montana and the distances between plants are great.

—Graf, of Bozeman.

Score Card for Raisin Bread

*It is Found that Factors Other than Those in the Standard
Set for White Bread Must be Counted*

NOW that fruit growers of several different sections of America are pressing their fruits upon American bakers as a bread ingredient, the time has come when a special score card must be adopted for breads made with fruits and ingredients.

So far the humorists have had the field of scoring raisin bread all to themselves. One has stated that a good loaf of raisin bread is one in which the family does not have to engage in a family row to see which member is going to get the slice with the raisin in it.

The believers in advertising truth have also taken a hand to condemn that baker who puts too few raisins in his loaf to give it an honest resemblance to the lithographs with which the raisin growers glorify their product "as supplied by your neighborhood baker."

It is easy for bakers to see that they should make a real raisin loaf or not make any at all. But on what basis shall a raisin loaf be scored?

The American Institute has taken this matter up, as it did originally the matter of scoring other types of bread. Not so long ago there was no official, standard bread score of any kind. A young lady magazine writer devised one, and some followed it. Service organizations devised score cards and their clients followed those. But such score cards gave no basis for comparison with standard bread conditions, the country over.

The government recognized no particular basis for scoring bread. The institute staff worked for a long time with all kinds and conditions of bread, and stud-

ied the types that found greatest favor among consumers. The result was a score card published by the Institute as official for American Bakers' Association. Under it no loaf has yet been scored 100, but loaves have scored over 90 as they approach the ideal held up as that to be achieved. Ordinary "run of the shop" bread has ranged from a score of 80 to 89 under this score card. After two years in service the card was amended slightly, and today is generally recognized as authoritative.

The government has adopted it and many state officials work under its terms. The Service Department of the Washburn Crosby Co. has recently sent to bakers a "Service Box," based on the card index filing system. One of the cards in it, along with many formula cards, is the standard bread-scoring card of the American Institute.

Besides raisin bread, which now has become a factor in the baking world, the prune growers are beginning to advocate prune bread and are devising machines to cut prunes up into raisin-size pieces for use in bread.

Similarly fig-growers are offering figs, cut into raisin-size bits, to the bakers for use in fig bread. It will, therefore, be but a short time before a diversity of fruit bread varieties will be a part of the usual bakery output. The score card offered here applies to raisin bread only, but study is progressing in the direction of cards for other fruit bread types.

The raisin bread score card is shown below, compared to the standard score card for white bread:

	White Bread	Raisin Bread
External Appearance		
Volume	10	5
Color of Crust.....	8	8
Symmetry of Form...	3	3
Evenness of Bake.....	3	3
Character of Crust....	3	3
Break and Shred.....	3	3
	30	25
Internal Appearance		
Grain	10	6
Color of Crumb.....	10	6
Flavor (aroma)	15	15
Taste	20	18
Texture	15	10
Raisins (amount and distribution)		20
	70	75
Total Score	100	100

On examining these figures we find the outside characteristics having the same value with the exception of volume. A raisin loaf scaled, say at 18 ounces, contains 3, 4 or 5 ounces less flour than a corresponding white loaf. In addition to containing less of the chief expanding ingredient, raisin bread has a substitute for this flour—raisins—an ingredient that does not expand at all in the dough other than as it swells when soaked in water. Hence we expect a smaller loaf when raisins are added. Some sections of the country may demand a large loaf of raisin bread, but practically all consumers have been found to prefer a smaller loaf filled with raisins to a larger loaf containing a decided minority thereof. A raisin loaf should not be overproofed in an attempt to get a large volume. On the other hand, the small flat loaf produced by improper handling is not to be desired. Five points of the total 100 were deemed appropriate for volume.

Next comes the color of crust. With raisin bread this item includes not only the color of the loaf but the appearance of and number of raisins on the top, bottom, and sides of the loaf, so that we

might perhaps have “appearance of the crust” in mind at this point. Any excess of burnt raisins on top of the loaf is of course not deserving of extra credit. We are thinking mostly, however, of the number of raisins on the side and bottom of the loaf. Until some convenient method is found of adding raisins to the dough to prevent their emergence on the outside—the number of raisins on the outside of the loaf will serve customers as a sort of crude index to the number on the inside.

Taking up the internal appearance, grain is first considered. This is of great importance in a white loaf. Some bakers will say that grain is not worthy of consideration in a raisin loaf; others, that good grain cannot be had in a raisin loaf; but Institute tests do not confirm this. Institute experience shows that a raisin loaf properly fermented and handled will produce a loaf with good grain. Or, in other words, a poor grain is due to improper handling. However, the presence of raisins makes a consumer less critical of the grain, hence on the point system the value has been reduced from 10 to 6.

The Color of Crumb

Much of the raisin bread bought commercially has poor color if we compare it directly with white bread. There are many reasons for this. Some consumers may demand a dark loaf, while some bakers wish to make their raisin bread “different” and add ingredients such as molasses that darken the color, or perhaps make a loaf of darker flours. The crumb may or may not be uniformly darker, but is often streaked. This is more or less expected when Muscat raisins are used, for very little handling causes them to give their juice to the surrounding dough. Over-soaked Thompsons act in a similar manner. The longer the mixing and rougher the treatment, the greater the amount of streaking, and we can quite easily reach a point where the raisins are

torn to such an extent that they exist merely as remnants scattered throughout the dough. Commercially, many sections raise no objection to a streaked raisin loaf, unless excessively so. We can readily see that the scorer has to consider many possibilities under this heading.

Flavor

Here we expect to get a pleasant flavor dominated by that of the raisins themselves, and any "off" odor due to improper fermentation or inferior raisins or other ingredients will be shown in the score.

Taste

Here again a fresh raisin taste should be prominent. Undoubtedly the raisin flavor (unless the raisins are very scarce) will mask or overshadow flavors ordinarily detected in a white loaf. The taste will be a very vital check on the flavor for certain imperfections that might not show up in the odor will be readily observed in the taste.

Texture

Referring to the remarks on grain, and keeping them in mind, the raisins present in a cut section of bread will prevent our getting the same velvety feel as in a "perfect texture" white loaf. Yet bread areas should have a soft texture denoting proper fermentation and handling.

The Raisin Content

According to government standards, much of the bread we get is not raisin bread, due to an insufficient number of raisins. Such bread should not receive high score, although it may be of very high quality otherwise. As a rough index of the amount of raisins in a dough, a count was made of the raisins in several slices of several loaves made from doughs containing varying percentages of raisins. Inasmuch as the distribution of

raisins is not going to be absolutely uniform in various loaves, such a counting method is not going to give results within .002 per cent, but still this item should be of help in deciding the value of this point. Included here is the distribution which should be fairly uniform throughout the loaf.

The Institute's Service Department is ready to receive raisin bread from bakers for study and scoring.

The first general use to which the new score card will be put will be in scoring raisin bread at contests in state and regional conventions. Heretofore such contests have been held on the basis of the standard score card for white bread, with such allowances for the raisin factor as individual judges choose to make.

—C. F. Rudmann.

Mr. Enright's Views

AS a believer in whole wheat bread Mr. Enright, of the Old Fashioned Millers, Inc., has preached long and lustily in its favor. He runs his mills to produce a whole wheat flour that he believes will bake an acceptable whole wheat loaf, for the refuge of many who argue for whole wheat, when shown that the loaf will not sell, is in a charge that the wheat used was not "genuine whole wheat," or had "been milled too long," or was "part floor sweepings—the floor sweepings of the mill going into its graham flour."

A charge containing some such implication went the rounds with Mr. Enright's name attached to it. He was questioned at once about it by Fred J. Lingham of the Federal Mill and Elevator Co., of Lockport, N. Y. And in reply Mr. Enright wrote: "Do you remember what it was that brought about the A. L. A.?"

Mr. Lingham did, and does. He gave us his view of that alluring incident of industrial growth. It is printed here that

bits of "under cover" whisperings about it may no longer carry the implications the whisperers no doubt intend to have carried. The story runs thus:

About 25 years ago millers in some sections of the country were found to be offering flour at a lower price than the wheat market made possible. An investigation developed the fact that corn flour was mixed with the wheat flour. This confused all merchandising standards and confused all price quotations, so the millers formed an organization known as the A. L. A., to further the enactment of a law prohibiting the mixing of wheat flour with corn flour, on the grounds that this constituted an adulteration of wheat flour. The law was passed and this trade abuse was cleaned up by action within the trade itself.

When the World War came on Mr. Hoover proposed the repeal of this law to permit the use of corn flour in wheat flour as a war measure. The millers who went along with Mr. Hoover in most matters, failed to do so in this one instance, for fear that if the anti-adulteration law was removed from the statute books they would have a hard time getting it back again, or might fail to get it back at all.

Should such a movement, with the history behind it sketched above be used now in a gossip campaign to discredit the very millers who brought a bad practice to an end?

All bakers know that whole wheat bread lacks only buyers to be popular, and Mr. Enright sees the changing views about the background of this refusal of people to take it up in volume:

"I think I can safely say that the Sun is rising on this subject of nutrition," he writes.

The Family Puzzle

My baker is a jolly man;
One day he chuckled, then he said:
"I bake a laugh in every loaf
When I am making raisin bread."

And this I know, his raisin bread
Brings to our meal a merry minute,
When each one tries to grab the prize—
The slice that has the raisin in it.
—Walt Drummond.

Growing—and Going Ahead

We might mention that we entered the baking business last year. It is our aim always to produce the highest quality in each line we go into. We are operating in a large daylight building, with our shop open at all times for public inspection. We want to grow and go forward with the new baking industry, and we would like to keep in closer touch with its national institute.

—W. C. Kimbrough, Lafayette La.

A Policy

Since I have been in Canada I have made a loaf of bread very rich in milk, crisco, malt, and sugar besides the addition of mineral salts. This loaf of bread has met with public approval, and is called by many bakers the Wonder Loaf. It is my intention to make even a better loaf and bring it to the attention of the public by advertising from the scientific side.

—George Gould,
The Slinn Bread Co., Ltd., Ottawa, Canada.

I am just in receipt of your letter with the scoring of our bread and wish to thank you for your kind service. This is what I would call service "Par Excellence."

—Bixler Baking Co., Youngstown, Ohio.

Towards A Complete Food

*Deficiencies of Cabbage and Butter, as Sole Articles of Diet,
Compared to White Bread Made with Milk*

By ROSCOE H. SHAW

Department of Nutrition, American Institute of Baking

THIS is the last of a series of papers reporting some simple feeding tests with white rats on some of the common every day single articles of food as compared with water bread and milk bread.

In all of the paper the purpose of the feeding tests was explained but to avoid misunderstanding it seems best to repeat. There was nothing particularly new brought out in these tests. The foods studied are all well known and their nutritional value thoroughly established. As far as we have been able to learn however, they had not been fed side by side in direct comparison with bread.

Bread has been subjected to a considerable amount of criticism because as was shown by a report which appeared not long ago, when white rats are fed on water bread as their sole diet they not only fail to grow but die in a short time. "Bread is bread" to many people and to them the fact that this was water bread and of course contained no milk, had small significance. It was not taken into consideration that there is very little water bread sold now-a-days. The vast majority of bakers' bread contains milk and the proportion of milk used in bread baking is steadily increasing. Even a small amount of milk in bread increases its nutritional value and the tenure of life of young animals when fed upon it, and when the loaf becomes 100% milk bread it is very nearly a complete food.

Again, critics of bread do not consider the fact that bread is seldom if ever eaten alone. It is for good reasons that nature has given us the craving for variety in

food. We cannot be satisfied with a meal consisting solely of bread any more than with one consisting of potatoes alone or any one of those dozens of articles of food that go to make up our diet. In our whole list of foods there cannot be found one that is complete in itself. It is only when combinations of food are eaten that all the requirements of the body for growth or maintenance are met.

The simple feeding tests, herein described, were undertaken for the purpose of showing the baker and bread consumer how some of the ordinary single articles of food compare with both water and milk bread and at the same time furnish some facts that answer the criticism of bread.

The previous papers reported the results of the feeding tests with apples, potatoes, spinach, butter, cabbage, rice, baked beans, eggs and milk. White rats fed on the first six of these single articles of food grew no better and lived no longer than they did on water bread. In fact in the majority of cases life was much shorter. White rats fed on whole milk bread grew in a practically normal manner showing that this kind of bread approaches the class of those few foods such as milk and eggs that are most nearly complete in themselves.

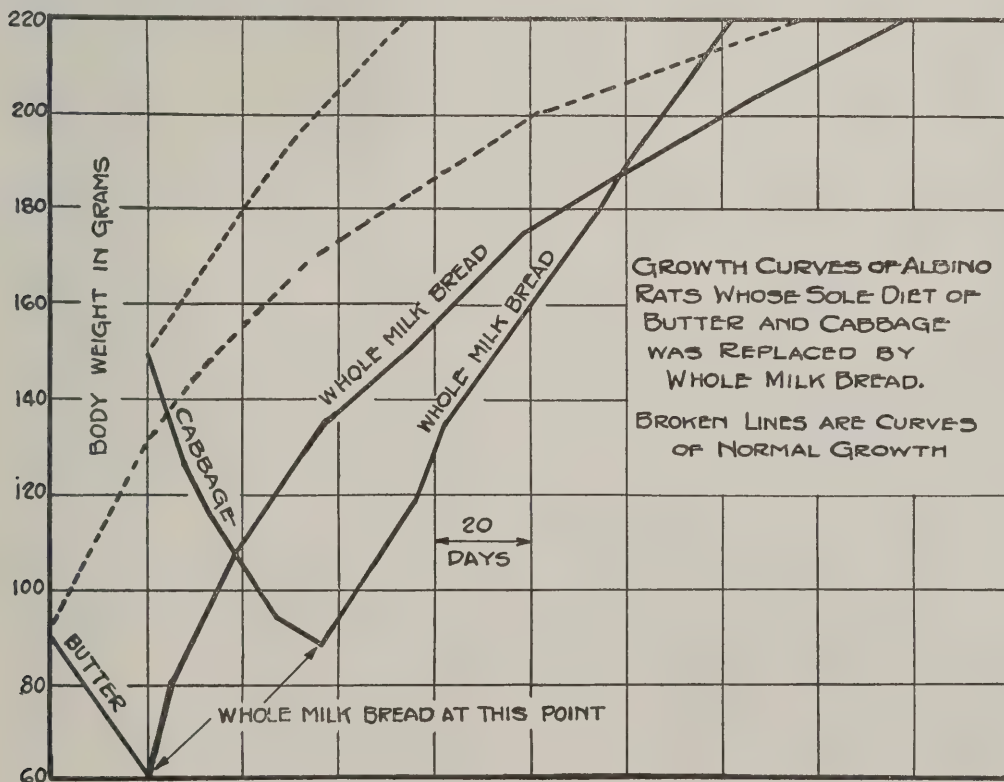
This paper shows some striking recoveries in the cases of two white rats that had been fed on certain single foods nearly to the point of death when their diet was changed to whole milk bread. The accompanying chart shows this very clearly. It will be remembered from a

previous paper that the rat fed on butter weighed about 90 grams when placed on this diet. He sharply declined in weight until death which took place in 37 days. Another rat from the same litter and of about the same weight received the same food but instead of permitting him to die his diet was changed after 21 days. At this time he had dropped from 90 grams to 60 grams and was so emaciated that it seemed unlikely he would live more than a few hours. As will be noted his recovery was immediate, his growth curve from the time of receiving whole milk bread closely paralleling the curve of normal growth.

Even more striking is the recovery of the other rat that had been fed solely on cabbage. This rat was a companion to the one reported in the previous paper that weighed 135 grams when placed on his diet of cabbage and which declined in

weight to 64 grams at death which occurred in 40 days. The rat reported in this paper weighed 150 grams when placed on diet. Thirty-seven days later he weighed but 88 grams and appeared to be near the end. At this point he was given whole milk bread and from then on his growth curve closely parallels the normal growth curve. This rat as well as the other reported above is still alive and growing as this is being written.

In butter and cabbage we have examples of two widely different foods. The one is a highly concentrated fatty food rich in an important vitamin but quite unbalanced as far as other food essentials are concerned. In the other we have a source of mineral salts, crude fibre and vitamins, but it is also an unbalanced food. Neither of these foods taken alone will promote growth or sustain life for more than a short period of



time, but when they are replaced with whole milk bread, growth proceeds in a practically normal manner.

In concluding this series of papers attention is again called to the fact that even water bread compares favorably with some of our common single articles of food, and that when whole milk replaces the water in the loaf, it enters the class of those very few foods which when eaten alone most nearly satisfy the body requirements.

White Flour Again

LIFE must have its moments of comic relief from strain and apparently all those who write, professionally, about food get them when they pick up the cudgels and belabor white flour, in favor of whole wheat flour.

They, themselves, have pointed out the joker for Alfred W. McCann, for instance, wrote once of a group of monkeys in the tree tops that lived happy and healthfully on cocoanuts and foliage while railroad surveyors underneath the trees, all fell ill of beri-beri and scurvy. The railroad workers were fed by a commissary which did not know about mineral salts and how they were lacking from the canned food diet on which the railroad surveyors lived. The moral was that the monkey could follow its instincts to a safe diet, and trust its appetite to guide it to a safe hunger for the needed foods.

Just so the American appetite has often preferred its own guidance to that of any nutrition worker or food writer, whether it is Dr. Copeland, or Dr. Wiley, or Dr. Holt, developer of a synthetic milk that would not meet the nutritional needs of those for whom it seemed to be chemically correct.

When the test tube was our best device

for learning about food ingredients, for instance, all fats looked alike and the statement that your body "required so much fat" seemed to settle the question. But when this principle was tested out by the feeding experiments of McCollum it was found that one fat failed to nourish the animal while another kept it going in happiness, contentment and health. Thus a change from butter to olive oil as a sole source of fat meant a change from life to death conditions.

Just so test-tube science told us that cabbage was of little food value. According to the calory theory it fed us next to nothing at all. Yet Maggie's instincts and Jiggs' appetite always cried for cabbage with the corned beef. In vain did the nutrition writers write in favor of cabbageless corned beef. It is not recorded that they stopped sales by one single cabbage head. All that Mr. Jiggs knew, as spokesman for the great corned-beef-and-cabbage brotherhood, was that he liked the combination and liked neither part of it apart.

Now that McCollum's newer light is shed on that important issue we know that Maggie & Jiggs were right and the nutrition writers and calory theorists were wrong,—that the appetite safely guided housewives to a food rich in vitamins and mineral salts, for lack of which the human body would deteriorate.

And when are these same folk going to appraise the power of appetite in relationship to the whole wheat white bread controversy?

"I'm glad we have had this whole-wheat crusade," said a big baker of **white bread**, "it brought me a fine bakery very cheap."

And so it had. A baker who gained the whole wheat enthusiasm spent \$300,000 fixing up a plant to bake whole

wheat bread through every phase from milling to wrapping. He went bankrupt and his bakery, sold in bankruptcy, came ready to hand for a white bread baker who baked by appetite appeal and not by the wisdom of the test tubes.

This baker still bakes whole wheat bread—as a specialty,—conscious of the fact that he cannot sell over 5 per cent of his output in that form and that consumers of whole wheat bread “will not stay sold on that type.”

We met an enthusiast over whole wheat bread recently who has devoted years to giving it free advertising. We suggested that both of us repair to a nearby cafeteria where the cafeteria baked its own bread in a volume suited to its needs. On trays, where any customer could pick up what he desired, were slices of whole wheat bread, raisin bread, white bread, and rye bread. We watched the customers come—and pick up white bread at the rate of over 90 slices to each ten of whole wheat picked up. The cafeteria was operated by a great institution and had a first class bakery in charge of a nutrition expert. Her figures verified our own count. In England a census of bakery output and restaurant and hotel demands has shown the same failure of whole wheat bread to impress the public.

Once all bread was whole wheat bread. White bread appeared in Roman times as a delicacy for the rich. It has remained with us and has captured the whole field on nothing but appetite appeal, or as some whole wheat advocates insist, on the sanitary and “whiteness” appeal to women who did not know they were thus “poisoning” their families.

Whatever the cause of their liking white bread, this fact seems to loom out of the controversy beyond dispute:

Whole wheat bread contains a percentage of cellulose from the wheat cover or

outer envelope that is as indigestible as the bark on trees, which is one with it in composition, or the skin on a banana or the hide of the cow that covers the beef-steak.

This indigestible cellulose is irritating in nature and seems to produce a gag in the appetite if eaten too consecutively and continuously. White bread, on the other hand, is 98 per cent digestible and offers the stomach no irritating wheat skin. With the skin is lost some mineral salts but these are fed to the cow in the form of bran, and come back to general use in the milk. White bread made with milk and spread with butter seems to give in a welcome and digestible form a bread as rich in mineral salts as whole wheat bread and richer in vitamins.

So that the argument doesn't mean much, as dietary habits work out. At any rate the best way to handle it for the assailed baker seems to be to invite the whole wheat devotee to any place where the people have free choice of breads—and watch the percentages. If anywhere whole wheat bread climbs over 10 per cent it can claim a world record.

Encouraging

To show our interest and confidence in the Association and its management I am enclosing application for membership for two more of our plants; also want to make application for one of my sons to enter the school of baking for the summer months.

I suppose my son will be one of the first of the second generation of technically trained bakers as it was in 1900 that I took a course of baking technology at the Chidlow Institute.

Wm. Fisch, Vice-Pres. & Gen'l Mgr.
American Bakeries Co., Atlanta, Ga.

Yeast's Growth in Dough

Increase of Cells Can Now Be Counted as Well as Cells That Have Died

By HAROLD E. TURLEY*

Research Department, American Institute of Baking

THERE is considerable lack of agreement in baking literature on the growth of yeast in dough. This is partly due to the lack of satisfactory methods for counting yeast cells in dough and also to the omission by the investigators of necessary details regarding conditions of fermentation. An examination of the literature available to us failed to show that any considerable work had been done in the development of methods for counting yeast cells in dough, with the exception of the work of Neumann and Knischewsky (1).

There are, however, methods still unpublished which are used in commercial laboratories. These will not be discussed here.

This lack of information in the literature led the writer to attempt to work out a more satisfactory method for counting yeast cells in dough, which would be useful in research and technical investigations, particularly in connection with problems of yeast nutrition, commercial "yeast foods," and bread improvers. Many studies of yeast nutrition published in the literature of bread making have been confined to nutrient solutions and other culture media and apparently little work has been done in connection with actual studies of yeast in such a complex habitat as dough.

The method of Neumann and Knischewsky (1) is as follows: "Different amounts of yeast were added to a dough consisting of 74 grams of flour and 45 of

water. A piece of dough weighing 15 grams was removed from the original dough and placed in 150 cc. of water. The gluten separated by washing 25 cc. of this solution was mixed with 25 cc. of iodine solution (150 cc. water + 1 gram KI + 0.05 gram I) and diluted to 400 cc. with distilled water. One drop of this solution was removed with a pipette and placed on the ruled area of a yeast-counting apparatus or ordinary blood-counting chamber. The ruled area on the slide contains 20×20 squares. The yeast cells were counted in a row of 20 squares so each figure in the table below gives the number of yeast cells in 20 squares. Three different slides were made from the same sample of dough and water.

To obtain a count for 5 squares, the 400 squares are divided by 80. Dough plus 4 grams yeast.

The writer attempted to use the above method, but found that it was unsatisfactory because of the difficulty experienced in washing all the yeast out of the gluten, as is shown in the following experiments. The bread formula was that used by O. W. Hall, in charge of the technical and service department of the Institute.

Flour,	325 grams
Water,	195 cc. based upon 60 per cent absorption
Yeast,	8 grams
Sugar,	10 grams
Salt,	5 grams
Lard,	6 grams

Total, 549 grams (weight of dough when mixed).

According to this formula there are

* Reprinted by permission from Cereal Chemistry.

present 0.0145 grams of yeast per gram of dough. Fourteen and one-half milligram portions of yeast were weighed in a covered glass weighing dish. Bits of yeast were taken from various parts of pound cakes of yeast. The weighed yeast was transferred to a 600 cc. beaker. Two drops of water from a 100 cc. portion were added to the beaker and the yeast and water thoroughly mixed with a glass rod. The remaining portion of water was added to the beaker and the whole thoroughly stirred with the glass rod. A drop of this yeast suspension was placed upon the ruled area of a blood-counting cell, observing the following precautions: The

squares, and 6 rows were counted in each preparation starting with the top row and counting every other row. It was determined that the average number of yeast cells in .0145 gram of yeast is 114,000,000. A typical determination is given in the table below.

4	3	13	5	27										
4	7	8	11	30										
7	10	4	1	53										
4	7	13	5	27										
					2	1	13	2	137					
					6	2	2	3		137 ÷ 24 = 5.7	cells in 20			
					—	—	—	—			squares			
27	30	53	27											

Preparation 1					Preparation 2					Preparation 3				
27	17	34	33		29	20	30	15		21	24	21	19	
27	27	23	38		20	25	29	16		21	32	25	27	
24	20	15	27		25	26	28	16		26	20	22	16	
25	30	33	19		21	32	18	21		24	37	24	29	
25	27	22	26		20	35	28	24		24	24	23	21	

128	121	127	143	Total	519	115	138	133	92	Total	478	116	137	115	112	Total	480
519 divided by 80 = 6.48 cells in 5 squares						478 divided by 80 = 5.97 cells in 5 squares						480 divided by 80 = 6.00 cells in 5 squares					

18.45 divided by 3 = 6.15 cells in 5 squares.

sents the average found in three preparations.

Dough No.	Yeast, per cent	Theoretical No. that should be found	Found by Neumann method,	Enzyme method,
		2.85	2.41	273
1	2.46	114,000,000	86,400,000	109,200,000
2	2.00	92,600,000	70,000,000	94,000,000
3	2.46	114,000,000	98,000,000	110,400,000
4	2.46	114,000,000	82,800,000	116,000,000
5	3.00	139,000,000	122,000,000	139,600,000
6	2.46	114,000,000	91,400,000	108,800,000
7	2.46	114,000,000	88,400,000	111,000,000
8	1.75	81,000,000	68,000,000	82,600,000
9	2.00	92,600,000	72,800,000	92,000,000
10	2.46	114,000,000	88,200,000	112,400,000
11	2.46	114,000,000	96,800,000	117,200,000
12	2.46	114,000,000	94,600,000	112,200,000

The writer has examined washed gluten microscopically from samples obtained from the service laboratory and observed many yeast cells embedded in the gluten. This observation was confirmed on the washed glutens obtained by the Neumann and Knischewsky method. The writer has been unable to remove all the yeast cells from the gluten as described in their method.

Method 2

The Neumann and Knischewsky method was modified by placing a known weight of dough in 100 cc. of distilled water contained in a 500 cc. brass Erlenmeyer flask. Several pieces of sharp steel were placed in the flask for the purpose of breaking down the dough. The flask was shaken vigorously for three minutes. The contents were then poured into a 250 cc. beaker and a drop of the suspension was examined on a slide and also in a blood-counting cell. Small fragments of gluten concealed some of the yeast cells and covered completely large spaces of the ruled area of the counting cell.

As the objection to the Neumann and Knischewsky method appeared to be due

largely to the observation that the yeast cells were obscured by the gluten, which also interfered with the counting area, it appeared evident that such conditions could be obviated by treatment of the gluten in such a way that the yeast cells would not be affected. The use of protein-splitting enzymes, as pepsin, trypsin, and papain, was thus naturally suggested.

One-gram portions of dough were weighed out and placed in 600 cc. beakers. Two hundred cc. of distilled water was added to the beaker at the temperatures stated below for the different enzymes, and the preparation was held at that temperature by means of a water bath. The time consumed in a complete breaking down of the gluten was as follows: pepsin 17 minutes at 60° C., trypsin 20 minutes at 50° C., papain 15 minutes at 65° C. In the above series of digestions, the pH was not determined. In the following experiments the reaction of the medium was adjusted to a definite pH for each enzyme preparation.

In the digestion with pepsin the medium was adjusted to a pH of 2.6 with $\frac{N}{1} HCl$

using thymol blue as the indicator. At this pH a complete breaking down of the gluten took place in 15 minutes.

When the papain was used the medium was adjusted to a pH of 5.2 with $\frac{N}{1}$ lactic

acid using brom cresol purple as the indicator. A complete breaking down of the gluten was secured in 12 minutes. This particular papain contained a gritty substance which made it objectionable for use in the blood-counting cell.

Digestion with trypsin was carried out at a pH of 8, using Na_2CO_3 for adjusting the reaction of the medium, and thymol blue as the indicator. Seventeen minutes were required to break down the gluten completely.

In order to determine whether the action of the enzymes dissolved or disintegrated the yeast cells, the following experiments were made. A suspension of yeast cells and water was prepared using 20 mg. of yeast in 100 cc. of distilled water. The number of yeast cells per cc. of liquid was determined with the blood-counting cell. Each enzyme preparation was tested as follows: As soon as the count had been made a half-gram portion was added and held at 55° C. for 15 minutes. The number of yeast cells per cc. was then calculated. It was found that this treatment did not appreciably affect the cells or reduce the number per cc.

Following this experiment a yeast suspension was made with approximately 25 yeast cells per field, using the pepsin, trypsin, and papain respectively. Certain yeast cells in the preparation were observed for 20 minutes in order to see if any cells disappeared from view or if disintegration took place. There appeared to be no appreciable effect on the living cells and during the time of the experiment only a slight effect was observed on some of the dead cells. On an average we have observed 1 per cent of dead cells in commercial compressed yeast. The action of the enzymes upon the dead cells was not sufficient to destroy their identity.

In the development of the method of counting using enzyme preparations, it was necessary to find a toxic agent for the suppression of cell multiplication so that any increase in cells during the count would not occur. Mercuric chloride is obviously inapplicable because it combines with the proteins. The toxic agent selected should not cause cell disintegration and should not reduce the stain selected, but on the other hand tend to fix the preparation, producing intensity

of color. The stain selected should stain as few particles as possible other than the yeast cell.

The following compounds were investigated: Toluol, formalin, lysol, sterilac (a commercial chloramine disinfectant), and phenol. It was found that phenol was most satisfactory.

Considerable work was done on the selection of a satisfactory stain. Iodine as used in the Neumann and Knischewsky method proved unsatisfactory because it stained both starch granules and yeast cells.

Methylene blue was found to be a satisfactory stain in connection with phenol as a killing agent, as only a small amount is necessary to stain the cells killed by phenol, while the starch granules are not appreciably affected and the yeast cells are stained a light or dark blue.

The proper quantity of phenol and methylene blue was determined by making up suspensions of yeast cells and wheat starch, and finally by actual trial with dough preparations. In a total of 5 cc. of the dough preparation the amounts used were as follows: 0.05 cc. of phenol and 0.15 cc. of methylene blue.

Method for Counting Yeast Cells in Dough

Sampling.—In order to obtain representative samples for examination, 20-gram pieces of dough are collected from different places from the dough batch and placed in a large moisture dish with cover. A one-gram sample of dough is weighed in a glass, weighing dish on the analytical balance. This sample is obtained by taking bits of dough from various pieces in the large dish. It was determined by actual count that there is not a great variation in the number of yeast cells per gram in different places in the same dough; especially in a well mixed dough. This was also observed by Neumann and Knischewsky.

Preparation of the sample.—The sample is placed in a 600 cc. beaker with 200 cc. of distilled water (acidified with 0.1 cc. NHCl) at a temperature of 65° C. Soluble

1

pepsin, 0.5 gram, is added and the preparation held at a temperature of 65° C. for 15 minutes. This may be done in a water bath. At intervals this digestion is aided by breaking up the small pieces of dough with a glass rod. Digestion is complete in 15 minutes. The digestate is then stirred thoroughly and 10 cc. withdrawn by means of a 10 cc. pipette graduated to tenths. Of the amount withdrawn, 4.8 cc. is then transferred to a 20 cc. beaker and 0.05 cc. of melted phenol is added, holding the beaker 1 minute at 65° C. with stirring. The phenol is allowed to act for an additional two minutes. Immediately 0.15 cc. of Loeffler's methylene blue is added and allowed to act for one minute. The sample is then thoroughly stirred and one drop (0.01 cc.) transferred to the ruled area of a blood-counting cell.

Counting and Calculation of Results

The yeast cells in a row of 20 squares were counted and recorded. Every other row was counted until the count in 5 rows had been recorded. Two more slides were counted from the same preparation. The total number of yeast cells divided by 15 gives the average number in a row of 20 squares. A typical calculation is given in the table below.

5	1	2	15
4	3	3	12
5	2	2	17
2	3	7	$44 \div 15 = 2.96$ average number of cells in 20 squares.
1	3	1	
—	—	—	
17	12	15	

$2.96 \times 20 = 59.2$, number of cells in 400 squares.
 $59.2 \times 10 = 592$, number of cells in 1 cu. mm. of liquid.

$592 \times 1000 = 592,000$, number of cells in 1 cc. of liquid.

1 gr. of dough in 200 cc.

$592,000 \times 200 = 118,400,000$ yeast cells in 1 gram of dough.

Summary and Conclusions

The above method has proved satisfactory for counting the number and studying the increase of yeast cells in dough.

1. We were unable to secure consistent and accurate results in the counts when we attempted to use methods which removed the yeast from the gluten by washing with water. The number of yeast cells found by such methods did not check with the calculated number based upon counts made on known weights of yeast.

2. The use of pepsin makes it possible to break down the proteins so that the yeast cells are readily counted without interference from large particles of gluten obscuring the field.

3. Pepsin does not affect the living yeast cells under the conditions stated nor disintegrate the cells killed by phenol to such an extent that their identity is lost.

4. Dead cells are easily stained and starch granules remain unstained, so that the identity of these elements in the field can be easily observed.

Reference

(1) Neumann, M. P., and Knischewsky, Olga. Zeitschrift fuer das Gesamte Getreidewesen No. 5, p. 113 (1909).

On Pasteur

One of Great Britain's most distinguished physicians recently stated in a public address that every town in the civilized world owes a statue in gratitude to Pasteur, the great French chemist, and I congratulate the American Institute of Baking in setting a good example by obtaining his bust for your halls.

—L. H. Baekeland,
 President, American Chemical Society.

Two Letters

I AM a baker in the government Indian school at this place, Andakaro, Oklahoma, and every fall I have trouble with the new wheat. It lasts for several months. The bread does not rise well, falls as soon as it reaches its limit, is often sourish and gets hard immediately after baking. The flour gradually improves and by spring makes pretty good bread under the same management as in the fall. Last fall we got some town flour, a different brand from the government flour, and that was all right. Can you give me any information that will help out.?

—M. L. Shortridge.

Dear Mr. Shortridge:

It is generally true that bakers have trouble with new-crop flour and as the flour ages this trouble disappears. The new flours for this year require about two per cent more water to make up a proper dough and they also, for the most part, require slightly longer fermentation than the flour for this time last year. I am inclined to believe from your statement that your bread was sour that you have been giving it a great deal too much fermentation. Please send me your list of ingredients, and all details in regard to handling the dough, including times, temperatures, proofing and oven conditions. At the same time send me a sample loaf of your bread.

—O. W. Hall, Service Department,
American Institute of Baking.

From a President

For a long time I have realized that the Holy Bible is the best sales manual that has ever been handed to man, and the Ten Commandments a Code of Ethics, which, when followed carefully, if not altogether 100 per cent, certainly alleviates the trials and tribulations that confront

the baker. If only he could be brought to realize that all his obstacles are man-made laws, of which in the making he is a part, and he could step out of line and be more dependent on the Golden Rule, he would be paid many times greater in proportion to his investment.

—From a letter of L. A. Schillinger, president
Gardner Bakeries, Inc., Baltimore, Md.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

of BAKING TECHNOLOGY, published monthly at Chicago, Ill., for October 1st, 1924.

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State of Illinois, } ss.
County of Cook, }

Before me, a Notary Public in and for the State and County aforesaid, personally appeared H. E. Barnard, who, having been duly sworn according to law, deposes and says that he is Secretary-Business Manager, American Institute of Baking, Publishers of BAKING TECHNOLOGY, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, American Institute of Baking, 1135 Fullerton Ave., Chicago, Ill.
Editor, I. K. Russell, 1135 Fullerton Ave., Chicago, Ill.

2. That the owners are:

American Institute of Baking, a Corporation not organized for profit,
H. E. Barnard, Secretary and Business Manager

M. Lee Marshall, Treasurer

Louis F. Bolser, Chairman

L. A. Schillinger, 1st Vice Chairman

J. M. Livingston, 2nd Vice Chairman

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

H. E. BARNARD,

Sworn to and subscribed before me this 1st day of October, 1924.

John Nalikowsky,
Notary Public.

(Seal)

(My commission expires December 14th, 1925).

Books for the Baking Laboratory

CHEMISTRY IN INDUSTRY. A Cooperative Work Intended to Give Examples of the Contributions Made to Industry by Chemistry. Edited by H. E. Howe, Chairman, American Chemical Society Committee on Prize Essays and Editor, Industrial and Engineering Chemistry. Published by the Chemical Foundation, Inc., New York. 372 pages. Illustrated with maps, drawings and photographs.

In this volume we have another contribution to the popularized literature of science. It tells the story so that he who has no technical knowledge will still be interested. For baking chemists, and the chemists of the flour mills the book is of importance because it shows them so splendidly the great world of chemical advance of which they are a pioneering portion. Unfortunately, however, the editor overlooked the baking industry as one to which the chemist has made important contributions and in which he is coming more and more to play a commanding role.

This omission is forgivable only on the grounds that the publishers plan a second volume, which intention would seem to be suggested by the fact that this volume is marked "No. 1."

The frontispiece consists of a photographic reproduction of an ancient bronze plate in which the chemist and his life and works are thus glorified:

The chemists are a strange class of mortals impelled by an almost insane impulse to seek their pleasure among smoke and vapour, soot and flame, poisons and poverty, yet among all these evils I seem to live so sweetly that may I die if I would change places with the Persian king.

The little assertion of the chemist's place in the world was written originally by one Johann Joachim Becher, phlogistonist, in 1669. And of course does not describe the conditions under which chemical advance is now carried on at the new Temple of Science, erected by the Chemical Foundation near the Lincoln Memorial in Washington. This building, one of the most beautiful in the world, has just been moved into by Mr. Howe, editor of this volume on chemistry's industrial invasion, and it is one of the first outgivings of the new home environment.

The industrial fields in which chemistry's invasion is described, include Abrasives by F. J. Tone, president, the Carborundum Company; Alcohol, by D. B. Keyes of the U. S. Industrial Alcohol Company; Coal and Coke, by F. W. Sperr, Jr., chief chemist, the Koppers Company; Cotton,

by Thomas C. Law, president, Law & Company; The Electrical Industry, by Buckner Speed, technical expert, the Western Electric Co., and A. B. Hooker, technical director, Hooker Electrochemical Co.; Fertilizers, by R. B. Deemer, U. S. Department of Agriculture; Industrial Gases, by Clark S. Robinson, Massachusetts Institute of Technology; Glass, by Alexander Silverman, University of Pittsburgh; Iron and Steel, by A. E. White, University of Michigan; Leather, by John Arthur Wilson, Chief Chemist, A. F. Gallun & Sons; Packinghouse Processes, by W. D. Richardson, Swift & Co.; Pulp and Paper, by Maximilian A. Krimmel of the Hammermill Paper Company; Perfumes and Flavors, by S. Isermann, President, Van Dyke & Co.; Petroleum, by Gerold L. Wendt, Standard Oil Co.; Synthetic Resin, by A. V. H. Mory, Bakelite Corporation; Rubber, by W. J. Kelly, Goodyear Tire and Rubber Co.; Textiles, by L. A. Olney, Lowell Textile School.

Each article is copiously illustrated so that the reader of Vol. I of what we hope will become a valuable series, may gain from his study a general picture of what chemistry in some industries has now attained.

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

The vitamins and their relationship to health and disease. A. D. Emmet. *Ther. Gaz.* 45, 768-72, 847-53 (1921); 46, 17-24 (1922); *Expt. Sta. Record*, 49, 159.—This is a general discussion of vitamins, including a brief historical introduction, classification and properties, tests for occurrence, and practical applications with respect to clinical medicine. The last named section, to which particular emphasis is given, contains an interesting table compiled from various sources of the comparative effects of the deficiency of vitamins A, B and C on appetite, growth, weight, digestive organs, heart, blood, endocrine glands, testes, ovaries, liver, spleen, eyes, leg and rib bones, teeth, and nerve centers.

H. G.

Physicochemical properties of strong and weak flours. VI. Relation between the maximum viscosity obtainable by the addition of lactic acid and the concentration of flour-in-water suspensions. P. F. Sharp and R. A. Gortner. *J. Phys. Chem.* 27, 771-88 (1923); cf. C. A. 18, 298.—In a previous paper it was shown that glutenin probably is the protein primarily responsible for the desirable properties of a strong flour gluten. The present study is an attempt to discover possible correlation between glutenin content and viscosity and loaf volume. Eleven flours were studied, the same which were used in a joint investigation with Rumsey and Collatz. Accurate determination of the amounts of the proteins in flours is difficult. The N in the fractions was determined by the Kjeldahl method. This was converted into protein by the factor 5.7. Determinations were made in duplicate of total protein, K_2SO_4 -soluble protein, alcohol-soluble protein, K_2SO_4 -soluble protein centrifuged, and alcohol-soluble protein in the residue after extraction with K_2SO_4 . A. O. A. C. methods were used, or slight modifications of them. The A. O. A. C. method of determining glutenin by subtracting from the total protein content the sum of the alcohol-soluble protein and the K_2SO_4 -soluble protein determined on separate samples of flour gives too low results, owing to overlapping solubilities. It is believed that the glutenin content is represented most accurately by subtracting from the total protein ($N \times 5.7$) content of the flour the sum of the amounts of protein ($N \times 5.7$) extracted by 5% K_2SO_4 solution followed by extraction with 70% alcohol. Gliadin and glutenin were found in about equal amounts in wheat flour. The concentration-viscosity curve of maximum imbibition produced by lactic acid in flour-in-water suspensions was shown to be logarithmic. The inorganic electrolytes present in the natural flours are shown to affect the constants of the logarithmic equation. $\text{Log. viscosity} = a + b$ (log. concentration). Glutenin or protein concentration if used as abscissa for the logarithmic curves tends to bring the curves more closely together. A relation between the quantity of glutenin, the quality of the glutenin as indicated by the constant b of the logarithmic equation, and the loaf volume is indicated. Flour strength, insofar as the colloidal properties of the gluten are concerned, apparently depends on the quality of

the glutenin. A numerical value for glutenin quality is given in the constant b , of the logarithmic equation. **VII. Physical state of the gluten as influencing the loaf volume.** P. F. Sharp, R. A. Gortner and A. H. Johnson. *Ibid.* 942-947.—This paper is a study of the effect of temporary changes in the H-ion concentration of the dough and of treatment with alcohol on the colloidal properties of the gluten as reflected in loaf volume. Doughs brought to a pH of 3 or 11 by addition of acid or alkali and subsequently neutralized lose their baking strength. Wheat flour loses its baking strength when made into a dough with either 70 or 95% alcohol and subsequently dried, remilled and baked. The baking quality of rye flour is not affected by such treatment. Rye flour contains no protein which responds materially to the imbibitional effect of acid. Thus it appears that the loss of baking qualities resulting from the extraction of gliadin from flour by alcohol does not prove that the gliadin plays a major role in determining the gluten quality. The same results are obtained by treating the flour with alcohol without removing anything from it. Thus flour strength, as far as gluten quality is concerned, depends on the colloidal qualities of the glutenin. The effect of alcohol in decreasing loaf volume is ascribed to its effect on the colloidal properties of the glutenin.

C. J. V. Pettibone.

Studies on wheat flour grades. IV. Changes of hydrogen-ion concentration and electrolytic resistance of water extracts of natural and chlorine-treated flour in storage. C. H. Bailey and A. H. Johnson. *Cereal Chem.* 1, 133-7 (1924); cf. C. A. 17, 1514.—Treatment of flour with chlorine effects an increase in H-ion concentration and specific conductivity of the water extract proportional to the dosage used in the treatment. Under ordinary storage conditions natural flours and C1-treated flours increase in H-ion concentration with the lapse of time; the natural flours seem to change somewhat more in this respect. Specific conductivity of water extracts remained constant when extracts of a flour stored for varying lengths of time were compared. Patent or high grade and clear or low grade flours changed in H-ion concentration at about the same rate with lapse of time. Flour extracted with ether and dried changed inappreciably in H-ion concentration when stored for 2 years. Ruth Buchanan.

Taking Fall Doughs too Young

IN THE fall of the year when the new wheats come in, unaged and unseasoned by storage, it is the time not to take your doughs so young. The fall of the year is the time of smaller volume loaves and production troubles.

It is the time when bakers and millers flood the American Institute with flour and bread samples, accompanied by trouble letters. Why? All because the new flour makes it more difficult to control fermentation so as to get proper development. If doughs are taken too young they lack oven spring and give small volume; if too old, they become sticky. To conquer the young doughs you must give them more time, and when you change your method of handling them to a method that more exactly fits their needs, they more exactly come into shape with the same kind of loaves your bakery has been turning out.

Here lies the explanation of what used to be a great mystery in the baking business—why flour will behave badly at the start of the crop year, and the self-same flour with the self-same treatment will fill the baker with pride in February, following his Thanksgiving-time dismay. Until scientific study was made of the wheat berry, there wasn't any answer. Then it was found that the gluten had to "set" in flour and was in a very different state when wheats were newly come from the wheat field than it was after the flour had had time to season itself in storage.

The result of such studies was more intensive care of the dough in the fermentation room. In the Service Department of this Institute O. W. Hall examined during October over fifty samples of bread from new flours and had to set down after his study of most of these loaves, "dough too young," "Not enough fermentation."

Or in some cases he had to pass judgment on bread where the baker had made the time of fermentation too long.

One baker got into deep trouble of that kind and sent in his offending loaves. They were handled in the Service Department, where it was found the score had dropped from 94½ to 85. The trouble? Doughs taken too soon—under-fermented.

"The receipt of your report," this baker replied, "caused every man in the shop to watch the time proposition a little more closely, and the result was that we obtained a good bread once again. When colder weather hit us the change in atmospheric conditions was not taken into consideration, with the result that it was again necessary for you to call our attention to "off" doughs. We are glad to note, however, that your latest criticism shows considerable improvement. We are forwarding another loaf today. Before baking it we installed a more systematic method of handling the dough exactly by time and temperature, and we feel sure that all future loaves sent you will be baked from dough having the proper amount of fermentation."

A far cry that from the days before it was learned that fermentation was a process carried on by living organisms that could be numbed into inaction or heated into infirmity and that worked vigorously only at one optimum temperature. Quality, of course, will follow in the wake of this move towards scientific dough treatment. Bakers who seek help as this one did are only one-tenth as many as there is capacity to handle at our Institute. As the service is rendered without special fee as part of the service of membership in the Association, it is to be wondered at that a great deal more advantage is not taken of it.

BAKING TECHNOLOGY

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in Baking*



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A New Bakery Department

EVERYBODY knows what enormous benefits have come to the makers of loaves of bread through conferences attended by men engaged in production work in bakeries. They have changed the baker's loaf from a thing that was the butt of the joke-smiths, and only considered worthy of mention when it could be contrasted with mother's loaf, made in the home, to a loaf that everyone respects and accepts as a fine, desirable product. The time has now come for conferences to garner in all known data about another phase of modern baking. This is the phase of "public relations"—the phase that has to do with

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keeping everything in the bakery so that it will be sure to be worthy of the respect of the housewife, and then of so telling the story that the consumer of bread will always know that it is as good as it really is. A conference to pull bread publicity, bread advertising, and the management of a bakery's sales department into the shape of an organized science will be held at the American Institute of Baking,

Tuesday and Wednesday, February 17 and 18. These dates have been tentatively set, and it is time to mark them down in your calendar, if you are interested in the sales problem of the modern

bakery. At this conference, bakers are not only wanted in person, but their best efforts at telling their story, of getting the knowledge about their plants that is essential to housewife appreciation of them, on over into the home, are also wanted. If any baker has put out any recent campaign material it is desired that he send it in so that it can serve as an object lesson to those who assemble here to discuss such matters.

The feature of the conference will be discussion, not set speeches. Insofar as there are set speeches they will be by bakers who have actually engaged in major efforts to tell the story of modern bread production, and are interested in developing their methods of attending to this important part of modern bakery service.

Taggart to Speak

All alert members of the baking industry will recall what Al Taggart of Indianapolis did when the demobilization of the farmer's best cash crop brought a farm crisis to America because of surplus wheat in 1923. Mr. Taggart had his force of associates draw up an advertisement which told how wheat was the key to American prosperity and since we could eat the key it was time to reverse action on the war, and eat up the American wheat surplus. This advertisement Mr. Taggart did not regard as part of his private business. He considered it a contribution to his industry. It was printed in *Baking Technology* with a suggestion that in every city bakers get together and mutually contribute money enough to have it printed in the local papers. It was. Copies of it came back from Honolulu and from cities of almost every American state.

Editors found in it material for editorials and news. Years of interest in that phase of bakery management had equip-

ped Mr. Taggart to have this editorial drawn and so worded that it would "hit the bull's eye" of the nation's mood and need. Mr. Taggart will have a leading part in the conference at the Institute February 17 and 18. With him will be Elmer Cline, who is as much immersed in bakery advertising problems as Richard Wahl, for instance, is immersed in bakery production problems. Mr. Cline will direct some of the sessions.

And all of these sessions will aim at a single target—that of starting all work essential in the baking industry to put the future work in public relations of the industry on a sound, organized basis.

Should the School of Baking open a post-graduate course to train bakery merchandisers so that this service will pass to a professional basis? If the majority of those at the conference decide that this would be advisable they can start such a plan upon its way.

Should the National association assemble a permanent exhibit of things accomplished in telling the story of the modern loaf? If those present decide upon such a course the exhibit will be arranged for.

Already set up, and available for intensive study by all who attend, are the exhibits of the Atlantic City convention. They were brought back to the Institute by Dr. L. A. Rumsey of the Trade Promotion Department of the Institute and were made available for research work. It is Dr. Rumsey's plan to have the exhibit, in its present preliminary form, kept as far up to date as possible and for that reason all advertisements appearing in National magazines, all newspaper campaigns, all house-to-house, window display, and letter campaigns, are gathered as they appear and are made part of the exhibit.

For instance, William P. Matthaei employed a woman expert in home economics work who was well known in Tacoma.

He had her study his bakery and its output. Then he financed a plan under which this woman wrote a letter once a week, each letter being only a single page in length. It called the attention of each housewife to whom one was addressed, to some special product of the Matthaai bakery. Pictures of the machines and food products in course of preparation accompanied the letters.

A Matthaai Example

The result was an enormous increase in friendly interest in the Matthaai bakery and acquaintanceship with its products. How different this work was from the previous practise of just turning out good products and leaving the consumers to find out for themselves what varieties they might order and what kind of ingredients went into each product! The Matthaai campaign will be part of the material to be studied at this conference. Any baker capable of getting an idea from it that will enrich his own practises is, of course, welcome to the free use of the material. This is a reproduction, in the field of bakery advertising, of the spirit the Society of Bakery Engineers brought to production conferences when they made them conferences "in which each man dropped into a common pot the total of his own experiences and then drew out whatever was of special interest to him."

Growth of the Idea

If this new spirit of cooperative research and development of the best ideas of all for all, permeates the baking world, our industry will become only one of many that have traveled far in this field. Not so long ago every jeweler considered the jeweler on the next block his competitor, and never met with him in amity or friendship.

A man appeared in the jewelry industry who came to believe that the real competitor of the jewelers were those who had

something else to sell the lady in the way of decorations. He believed that if women knew more about the story of diamonds they might get a liking for them—such as the jewelry connoisseur has. So he wrote up advertisements telling this and that about each type of jewelry—giving the latest news about the development of the art of jewelry making. He went to various towns and tried to get the jewelers to meet together and jointly finance an advertising campaign to popularize jewelry and inform people of the special advantages for special occasions of special forms of jewelry.

Jewelry Experience

Of course he encountered trouble. Most of the jewelers had excuses why they could not sit down in friendliness with other jewelers in their towns. Many had alert suspicions that the movement was a "fake," fostered by some rival to get them to pay part of his advertising.

Often this apostle-of-cooperative-advertising got jewelers together for the first time they had ever met and after initial hostilities were over, he would induce them to engage in a local campaign. Results? People learned more about jewelry. They gained a liking for it specifically—for certain articles that were in fashion and were seasonable. Sales increased in rich abundance. The get-acquainted advertisements worked out.

Mr. Avayard's Success

A. E. Avayard of Chicago has written advertisements for many cooperative campaigns that were campaigns of education towards a whole product. He has made a study of twenty-seven such campaigns some of which were great successes while others were comparative failures. One of the expectations of those in charge of the conference program is that Mr. Avayard can give those attending the benefit

of his ripe experience in this field. In the next issue of *Baking Technology* the story will appear of many campaigns for whole crops or whole industries, that may serve as guide lines to the problems of bakers.

Do you know, for instance, that whereas there was only one newspaper in America in 1690, "Public Occurrences Both Foreign and Domestic," published in Boston, there are now 23,000 magazines and newspapers with an estimated combined circulation of 50 million copies for the magazines and 45 million copies for the newspapers. The advertising appropriation of American industries is a billion dollars per year, while billboards and printed space fills 3,000 square miles of surface?

Where in all this maze of broadcasting is the baker going to release his message? His opportunity is to come to the American Institute in the ides of February and find out.

I have just attended a conference of bakers held this month at Hobart, Tasmania, attended by prominent bakers of New Zealand and Australia. The largest item of discussion was, "Is the baking trade of Australia keeping pace with modern baking movements?" I took the liberty of contributing a paper based on the scope of your Institute at Chicago, as revealed by your publications. I contended that the time had come for Australia to have something similar. Our leading bakers agreed that they ought to visit America for the purpose of studying your Institute and exchanging ideas.

—From a New Zealand Miller.

To reply to letters such as the above and thus spread the story of milling and baking advance, is one of the fine rewards that come as a result of having set up the American Institute as a center for baking and milling science.

Things to Take Note of

THE New York Times for Nov. 30 carried a full page article on the development of mass production methods in baking. If you want to see a copy write the Institute.

Nation's Business, the magazine published by the U. S. Chamber of Commerce gave chief place in its December number to the story of modern baking. If you want your friends to see this story send for copies of the magazine to the Institute, or to the U. S. Chamber of Commerce, Washington, D. C. The story is highly illustrated.

Is your bread all you want it to be? The Institute Service Department is steadily watching the bread of hundreds of bakers, and many report that they have built up both quality and sales through this service. Why not use it? There is no cost above your regular dues. Just send in your bread for study, scoring, and advice as to possible improvements.

The Lions Club Magazine for December carries a story by President Bolser on baking development as affected by clubs with business ideals—such as Lions, Kiwanis, Gyro, Rotary. If you have to make speeches at such clubs here is data for you. Send to the Institute for your copy, if interested.

A baker worked out a principle of co-operation with grocers to help them in their problem of holding trade. His story is told in the *Grocers Bulletin* for January. Do you want to use it as a model? If so a request will bring you a copy.

Eleven presidents of American Bakers Association all in a row have been Ro-

tarians, — Haffner, Burns, McDonald, Stude, Ward, Smith, Power, Campbell, Korn, Stritzinger and Bolser. The story of their administrations is told in the Rotarian Magazine for January. A copy will go forward to you on request.

A Bread Nostrum

MOST patent medicines only appeal till somebody tells the truth about what's on their label, and then faith in those who pretend and fulfill not is destroyed. Baking Technology opposed the idea of having bread carry the odium of nostrum advertising. Many writers have since picked up for use the data about this invasion of the baking field by the nostrum advertising.

"I hope you will continue to keep us informed on your laboratory tests of nostrum breads such as Jack Sprat breads," writes Alice Bradley, principal of Miss Farmer's School of Cookery in Boston, and cooking editor of the Woman's Home Companion. "You are doing a splendid work and I have frequently used excerpts from your magazine in my newspaper articles."

The column on health by Dr. William Brady is printed all over the country in a newspaper syndicate series. "I am quoting," writes Dr. Brady, "some of the anti-fat data prepared in your laboratories, particularly the comparative analyses of 'anti-fat' and honest bread. That may help to save some fat woman from jollyng herself."

What Makes Price?

If purchasing power of the dollar is taken as the price guide, prices will often appear in a very different light from what

they are if only money figures are given. For instance, according to the Better Bread Magazines, bakers in 1821 sold a 42-ounce loaf for 12½ cents, but a workman could only buy, for his day's wage 340 ounces of this bread. In 1923 the average workman, for his day's pay could purchase over 1,400 ounces of the best bread. At this rate bread is about one-fourth of its price of a hundred years ago.

Dr. Wiley Peeved

ONE of the ambitions of Dr. Harvey W. Wiley is to win the world's long distance living record. Recently he was tendered a banquet on the occasion of his eightieth birthday, and he formally announced his ambitions in that direction. But away off in some remote European country an old man appeared who claimed he was away up towards 150 years old and could prove it by a birth certificate, and by recollecting accurately historical events over a century in the past. Dr. Wiley let his rival for the longevity record alone until he told how he got that way. The unfortunate oldster announced that he had achieved his years by eating eight pounds of bread per day. He did not specify as to white or whole wheat. But the mere thought of those eight pounds of bread per day caused Dr. Wiley to say things that a football player says when he thinks his opponent is holding in the clinches. He protested audibly to a Washington newspaper that his European competitor was cheating on the rules as by the very statement of his diet he should have been dead a whole century ago. And what if it should turn out that the ancient man eats his eight pounds per day in the form of white bread? We have proposed to Dr. Wiley a joint commission of inquiry!

BAKING TECHNOLOGY

A Monthly Journal devoted to the Advancement of the Baking Industry, publishing the official notices of the American Bakers Association and interpreting for bakers the work of the research laboratories of the American Institute of Baking.

I. K. RUSSELL, Editor

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DECEMBER 15, 1924

We Work Together

To win through knowing our markets and developing their full potential possibilities, a higher place for the baking industry in the great family of America's business life.

Underneath

IF everyone interested in the industry knew the value of the work going on at Chicago we would be one of the largest purchasers of stock securities in the country from our revenue, instead of spending considerable time each month in allocating our income towards the channels that seem most important to the industry.

To me, that's really the attractive part of this entire work, trying to sell the baker his own business. Isn't the fascination of our own individual baking business at home built around our ambitions and struggles to help the American housewife see the value of our loaf of bread against that which she can produce? And, just as true to me comes the fascination of this same problem in trying to make the baker see the value to himself of the work carried on by the Association.

Too many years have been spent by the baker in efforts to urge his brother in the

industry to join the National Association because of the good fellows he will meet, because he should be a member of his own association, because if he gets into trouble he will have someone to appeal to, and for a thousand and one other reasons which could apply to the Cannery Association as well as ours.

The ambition of the National Association this year is not to sell the baker his association along these lines, but let him feel the results of actions and accomplishments not seen but felt; behind the scene this work is now going on at Chicago, without particular glory to the people doing the job, (but it must be someone's fault that the packers, the butter people, the milk people, etc., etc., are using bread in connection with nearly all of their national advertising. It didn't just happen that the national magazines interested in foods and health should suddenly change from a position of criticising the baker's product to a platform that now demands more information from us, so that they can tell their readers more about bread and its relation to their needs.) This is just a part of the work being done by Dr. Barnard, Morison, Turley, Hall, Shaw, Rumsey, Bishop, Lucknow, and the rest.

Scientists have not been burdening the baker in years gone by asking for an opportunity of studying his problems in his shop, but Science is interested and is helping the work going on at the Institute.

All this didn't just happen, it was planned; and just as soon as the baker realizes this,—then and then only will we not only rank seventh in size in United States' listed industries, but our own numerical strength in members will be in proportion, and the *undone work planned for the future can begin.*

LEWIS F. BOLSER,
President.

Preparedness

UP IN Guelph, Canada, a baker named Robinson trained his sons to play all the instruments of a family orchestra. They played, and played and played—to no audience in particular. Then the Canadian bakers' convention held a meeting there to pass upon a plan to build Trent Hall as a center for the scientific study of fermentation. The decision to erect this building was made to the lusty strains of the Robinson family orchestra, all, including the drummer grandson, being contributors to this move to advance baking science in Canada.

Pineapple Next

WHEN James Ford Bell presented through the Wheat Council of the United States, the picture of a great array of industries whose goods bread carried to market, he spoke for a new attitude towards the baker on the part of vast zones of business and industrial life.

He asked wheat growers to remember that the bakers sold their wheat in the form it is eaten, the butter makers to look upon butter as a covering for a slice of bread, the cheese makers to see cheese as a filling for sandwiches, and the railroads to see the baker as the man whose sales brought wheat traffic to their railroad lines.

His picture of a State of Facts was viewed by many curious persons in curious ways. Those who concentrate on selfish activities which are counted on to pay themselves out in immediate individual returns, saw in it only a disguised advertising move for Bell himself. Farmers, always suspicious when not organized, saw in it an effort to bear down wheat prices, since it spoke of eating up a surplus.

But great groups of food merchandisers

saw in it the orderly, intelligent way to drive their foods through to market. We have seen the work of the Wheat Council outlasting its life with ever-growing vigor. Cooperative efforts are now the rule in all work to "tell the story" of food staples. Perhaps the second or third largest force in bread merchandising is the organized group of farmers who grow California's raisin crop, and forecry it every year with \$2,500,000 worth of advertising matter, all aimed at creating good will and an appetite for raisin bread and pie—to be bought at your nearest bakery.

Now come the Hawaiian pineapple growers. They appeal to us to teach American bakers that pineapple pies cannot honestly be made with dried apple and other fillers, in addition to a mere showing of pineapple. That lesson is easy. It ranks with the eliminating of almost raisinless raisin bread, flour diluted with corn meal, and cakes made with eggine instead of eggs and synthetic whipine instead of cream. Many forces combine to keep American bakers sold on the idea that the quality way is the one way that wins. They carry their associated foods to market honestly, and thus deserve the bigger and bigger load they hope to be theirs.

Wheat Farmers

WHEN will wheat farmers get behind wheat in the form it is eaten as other food producers do behind the wheaten loaf? The Farm Bureau Federation discussed wheat sales for three days in a Chicago convention, but never said a word about the real wheat merchandisers. We predict that another year's convention will not be so organized, and that wheat men will live to learn as much about bread's merchandising problems, with a view of helping them where they can, as other co-operators who grow foods used in bread do.

White Bread in Nutrition

*Its Place Has Been Gained Through Public Favor as
One Part of a Balanced Meal*

By ROSCOE H. SHAW

Department of Nutrition, American Institute of Baking

THERE has been a tendency of late, particularly among writers for the popular press, to attack white bread especially when comparing it with the whole wheat variety. Just when or where these attacks began would be difficult to state, but it is quite obvious that they are real and that they are serving to prejudice some, especially those accustomed to accepting statements without proof, against one of our most valuable articles of food.

If these propagandists confined their activities to increasing the popularity of whole wheat bread there would be no objection, for there is no issue on the high food value of this form of bread. Such, however, is not the case. White bread has been bitterly assailed. The purpose of this paper is to present some data to the baker and bread consumer in an effort to clarify the facts as to white bread.

The baking industry, like all industries, is based on the old economic law of supply and demand. Generally speaking, the same bakers make both kinds of bread. When there is a larger demand for whole wheat bread, there will be no lack of it on the market. There is none today, for that matter. The fact is that in spite of all the propaganda in its favor, whole wheat bread is not popular. In cafeterias and elsewhere where people have a choice the proportion of whole wheat bread to white bread eaten is very small.

The propagandists for whole wheat bread would have us believe that through some process of alchemy or otherwise the miller has transformed wheat into some devitalized product unfit for human con-

sumption. Some of the more abusive ones have gone so far as to call it a poison.

What, indeed, has the miller done in this metamorphosis? Perhaps no food product has been more thoroughly investigated than has wheat. Chemistry and the modern science of nutrition tell us that when wheat is milled, a small part of the proteins, some of the fat, some of the vitamin content, some of the mineral salts, and nearly all the crude fibre or roughage is removed. The protein content, the part of food that builds and repairs tissue, is but slightly less in patent flour than in the wheat from which it came, and its actual food value in terms of calories, due to the concentration of the carbohydrates is really greater. Patent flour has suffered the loss of some of the important mineral salts and vitamins as well as the fibre, which, although of no food value, is of service as an intestinal cleanser.

A point that should not be lost sight of in this connection is the fact that our white bread of today is not that of the European, nor indeed like ours of a decade ago. Milk has found its place in bread-making. There is little white bread sold on the American market today that does not contain some milk. When milk enters the loaf it makes a wonderful difference in its nutritive value. Supplementary proteins are introduced that increase the variety of essential nutrients now known to be so necessary. The vitamins of the milk reinforce those of the flour, and not the least important is the lime of the milk which bolsters up the

inadequate lime content of the flour or even the wheat kernel itself. Feeding tests have shown that whole milk bread, i. e., bread where the entire liquid ingredient is whole milk, is more nearly a complete food than whole wheat bread.

By Bread Alone

When that day comes that will see us sit down at a dinner table, order a loaf of bread as a complete meal, we may feel some concern in that we will not be getting quite so much in white bread as we would in whole wheat bread, assuming that neither are made with milk. We would have cause for some concern in either event, for whole wheat bread is not a complete food, being only slightly superior to white bread in this respect. The fact is, of course, that we do not eat either kind of bread without supplementary food. Even the spread of butter adds fat, a vitamin and some protein. If we take with the bread a glass of milk, for example, and a little lettuce or celery, there has been supplied not only everything that the miller took away, but furnished in a more palatable and better balanced form.

Most Foods Incomplete

Perhaps many of us do not realize that few if any of our single articles of food are complete in themselves. It is only when eaten in combinations that the proper balance is secured and the requirements of the body are met. We would hardly say potatoes, apples, rice, cabbage, spinach, etc., are poisons, yet not one of these alone will support life more than a few weeks in a growing animal. Do we call cream devitalized because the skim-milk has been taken away, and by the way, in skimming, a far greater proportion of food material has been taken away than in milling wheat? Or carrying it still farther, shall we say that butter is a poison because the butter-milk has been removed in the process of churning?

We have come a long way since the days when our ancestors prepared bread by first pounding wheat between two stones, mixing it with water and then baking on another stone that had been heated by building a fire over it. The kind of bread that satisfied them would hardly appeal to us of this day. We would not care to live in their kind of huts nor would we be satisfied with their manner of transportation or the clothing that prevailed in that period. We believe that life is more worth while now than in those days. Our tastes have developed with the times, and that applies just as truly to what we eat as to our external surroundings. The milling of wheat has kept pace with progress in other directions. If some of us prefer, rather than eating whole wheat bread, to supplement white bread with one or more of any number of things found on almost any dining table that supply its few deficiencies in a more palatable form, we are making no nutritional mistake. This is the view held by the leading nutrition experts of this country.

Raisin Tarts

IN eternal variety lies the secret of sweet goods' success. A new delicacy is coming into the market to be made out of large tins of raisin pie-fruit and pie-crust. A baker who had a pan moulded to carry a dozen "potato dogs" used a dozen pieces of thin-rolled pie crust instead and filled each mould with raisins. He found the resultant raisin tarts sold better than raisin pie, for there was less both of the raisins and the crust and people found the amount of both just to their liking.

"An apple a day—the apple pie way" now threatens to become a standard apple-pie slogan, and co-operative apple growers may start a campaign to popularize it as much as they have already popularized the appeal of its first sector to raw apple consumers.

The Drive on Bakery Frauds

How Pure Food Officials and Laboratory Tests Build Up Our Industry

By H. E. BARNARD*

Director, American Institute of Baking

If bakers bought ingredients by laboratory tests and not by brand, would they ever be deceived by "shortening materials" that on test prove to be mere mixtures of fats, glucose, water, glycerine, salt, and some easily hydrolized starch? Would alum ever find a welcome when disguised as cake shortening? Would they buy "bakers' malt," which instead of being dehydrated malt is really a mixture of dried malt extracts, cane sugar, and aniline dye? Dr. Barnard here says no. And he points the way to a combination of Laboratory reliance within the industry with Pure Food Law inspection from without, which will carry our industry to its greatest possible point of public service.

A STUDY of the reports of state and federal laboratories which for twenty years have been engaged in the control of the food supply will convince the most optimistic observer that legislation was needed at the time laws were enacted and that enforcement is just as necessary today as when food inspectors first collected samples and analysts first sought methods by which to determine the devious ways of vinegar manufacturers, spice grinders and ketchup bottlers.

We may safely conclude that conditions are as satisfactory in the food market as they are today because we do have laws and the means for enforcing them. But there will never come a time when some eager pursuer of nimble dollars will not leave the path of righteousness and take short cuts in his zeal to reach riches.

And more and more we appreciate the fact that the inspector who is simply an inspector, whose eyes see nothing but misdeeds, whose contact with industry is always tainted with thoughts of fraud, whose mind is wholly filled with regulatory effort and wholly void of constructive assistance, is a mere policeman standing at the patrol box, serving his

community only as he checks off penalties and completely missing his great opportunity to work constructively in the building of more efficient and useful industries.

To be sure, too many of the men who fit this measure of uniform and baton meet little evidence of desire for help on the part of manufacturers. They never catch the spirit of co-operation which is more and more dominant in industry. They judge the whole by the fragment which they see in their daily rounds.

The packing industry is visualized as the local butcher grown large; the great canning industry is to them but the little neighborhood canner multiplied a thousandfold. To them the baking industry which handles sixty per cent of all the flour which flows in a never ending stream through thousands of mills is but the aggregate of all the little neighborhood bakers who painfully mix and knead their simple doughs in the same way their forefathers did before them.

And yet there is almost no trace of the butcher or baker in the great industries which now produce our bread and meat. Hams and bread are the products of manufacture instead of craftsmanship. **The problems of production concern standardization of machinery, and formulas and**

* An address before Association of American Dairy, Food, and Drug Officials at Chattanooga, Tenn.

the utilization of materials bought under specifications and compounded by technicians.

In four cases recently reported by C. A. Browne, chief of the Bureau of Chemistry, stocks of evaporated apples, involving 958 cases and 269 boxes, were seized because of adulteration by excess water. That is, the apples were not properly dried, the owners evidently believing that the sale of water at apple prices was good business.

Nine seizures of chocolate involving many thousands of pounds, were reported. In some cases admixture of cocoa shells was the reason for the action, in others the removal of the natural oil and the substitution of a foreign and cheaper oil.

Large quantities of butter were seized, in most cases because of the presence of excessive moisture. In four cases, evaporated milk was condemned because it was unfit for food.

A large number of egg cases were reported. Over 300,000 dozen of shell eggs were condemned in 83 seizures. Three hundred and eight cases of egg yolk, 830 cases of dried egg and 489 cases of frozen eggs were destroyed because they were unfit for food.

Recent Seizures

Eleven seizures involving 4,466 sacks of flour were reported. The flour was either heavy with excess moisture or short in weight. It is of interest to note that during the entire period since the food and drugs act was passed only about 100 cases have been completed in which there was any law violation in the manufacture and sale of flour, including barley, buckwheat, corn, gluten, graham and rye flours.

There has always been a considerable adulteration of jellies and jams, but among the last 1,000 seizures but 21 were

reported. In most cases the reason for the action was misbranding.

Bad Walnuts Seized

Shelled walnuts have a considerable use in fillings and toppings for cakes. The grades used for this purpose are obtained from the waste of the factories where the meats are shelled out and consist of the broken pieces of the meats. There are, of course, many immature and mouldy nuts which contain meats which are unfit for food. These low grade products may have some commercial value as poultry food but they are certainly not suitable for cake making. **Nevertheless considerable quantities of walnut meats which are quite unfit for food have been consigned to the bakery trade and long since would have gone into consumption if the inspectors of the Department of Agriculture had not made 19 seizures, involving 142 cases, 378 bags and 36 boxes. One seizure was made of 300 bags of almonds, described as decomposed and putrid.**

Before the enactment of pure food legislation pies baked outside the home kitchen were eaten with little knowledge of their composition, a fortunate thing perhaps, because in those historic days fillings were everything but what they seemed. The present day commercial pie usually is a different product, made from selected materials under approved conditions. But three seizures of pie fillings, involving some 400 packages are included in the last 1,000 seizures. The goods condemned were imitation products, falsely labeled as to composition.

Raisins are being produced in increasingly large quantities. Their value in the dietary is established and the quality of raisins supplied the trade is on the whole quite acceptable.

Four seizures including 900 boxes, 690 bags and miscellaneous lots described as

"quantities" were reported, the usual complaint being that they were decomposed.

Spices, once perhaps more commonly adulterated than any other food, are now greatly improved in character. Seven seizures of more than 1,200 cases of coriander and caraway seed have been recently reported due in most cases to the admixture of dirt and foreign material.

This brief survey of the activities of the inspectors and chemists of the food and drug Department of the U. S. Dept. of Agriculture shows on the whole a reasonably satisfactory condition of food materials destined to enter consumption in the form of baked goods.

The cases related do not, of course, comprise every shipment or sale of adulterated products for no inspection service can hope completely to check sophistication and fraud. Their chief value is in showing the character of raw materials today and in giving the consumer the feeling of security and assurance which so greatly helps to make good appetites.

Several states have, however, made most interesting reports of their studies of baking materials. I quote from a letter from Commissioner Emery of Wisconsin, who writes: "We are sure that such subjects as jellyless jelly roll, eggless egg white fillings and creamless cream puffs, made possible by the use of gums and saponine and the fraudulent use of artificial colors to make certain bakery products to appear to contain what they do not, is a field which we believe to be fertile with frauds and which we hope to enter at no very distant date."

Director Hartman of the Bureau of Food and Drugs of Michigan, writes: "We have been giving special attention to bakery inspection during the past winter, both as to sanitary conditions and the kind and quality of raw products being used. It is our impression that bakery

sanitary conditions are being substantially improved, and our further impression is that a very large majority of bakers are using a higher quality of raw materials.

Inspectors in Detroit report that bakers are using better quality canned goods. Coupled with our bakery inspection and in co-operation with the Chicago Station, the U. S. Bureau of Chemistry investigations during the past few months have disclosed a large quantity of unwholesome frozen eggs, resulting in seizures in several cities, of which seizures close to eighteen tons of frozen eggs were condemned, denatured and destroyed."

Dr. Rowland of the Division of Food and Drugs of Kansas, writes: "We have done little or no analytical work in this department of products used in the bakery, such as pie fillers, cake icings, flavorings, fruits, etc. There has, however, come to the notice of our inspectors canned fruits in some of the bakeries which appear to be at least of substandard quality. There has been a practice to some extent by wholesale dealers to sell to pie bakers canned fruits which become swells, springers and flippers while held in stock or which appear from the outside of the can unsalable to the trade.

Some Inspectors' Views

"We are not prepared to say that most of these fruits are unsuitable for food purposes but unless the baker is very careful in his selection and eliminates the tins which show evidence of spoilage he will, I am quite sure, get some which should not go into his pastries. I am not sure that the baker should be given the privilege of selecting the tins which he should use from such stock, that is, there is a question in my mind as to whether or not it is safe for the baker to use the fruits which he purchases from salvage stock that have, from the external appearances of

the tin, undergone some change out of the ordinary."

Commissioner Jones of Illinois, reports the analysis of some 180 samples of adulterated baking materials, such as spices, extracts, lards, preserves and syrups. It would have been of interest to know the type of adulterations found, the trouble with the syrups, the faults of the spices, the illegality of the evaporated milks, but of yellow cakes are tabulated:

Dr. Bailey's Work

In the annual report of the Connecticut Experiment Station, Dr. Bailey says:

In that section of the report devoted to bakery products the results of the study of yellow cakes are tabulated.

"A number of bakery products, all yellow cakes, were examined for evidence of eggs and for artificial colors. Flour and eggs, or egg products, contribute all, or essentially all of the phosphatid or lipid phosphorus in this class of foods. Milk and shortening materials which consist of, or contain, milk constituents (butter and the margarines), may contribute some phosphatid type in those products in which they are used, but the amount will be relatively small.

"In the samples of pastry examined, lipid phosphoric acid was determined in addition to the usual proximate constituents. "Fat" is the alcohol-ether extract upon which the lipid phosphorus was determined and not "fat" in the generally accepted sense of "ether extract." For comparison in the case of sponge cake, two experimental cakes were made using the same recipe but with varying proportions of eggs.

"No artificial color was found in any of the samples and the lipid phosphorous content would indicate appreciable or substantial amounts of eggs or egg material. In general, the cakes contained from 20 to

25 per cent of moisture. Three approached or exceeded 50 per cent of moisture and the liquid phosphorous content is correspondingly low in these samples. Cup cakes showed the lowest percentage of this type of phosphorus."

Report of Dr. Foust

Commissioner Foust, of Pennsylvania, has reported the results of a very complete survey of the food markets of his state. Without attempting to analyze the nearly 6,000 cases investigated it will be of interest to refer to specific cases of food frauds. He reported, for instance, the finding of 31 cases of butter adulterated by excess water or deficient in fat. Eight samples of milk were adulterated with other fat than milk fat. Five samples of biscuits and nut bread contained a coal tar dye. Two fruit cakes contained sulfur dioxide. Fourteen samples of flour contained added chlorine, two chlorine and nitrous acid, and three nitrous acid in violation of the Pennsylvania law which prohibited flour bleaching.

Miss Vance, Director of the Bureau of Foods and Drugs of Kentucky, has made a valuable and interesting study of baking materials during the past year. The analytical data reported on such products as cream fillings, cake icings, whip powders, pie fillings and other items which are used in large quantities in the manufacture of sweet goods, pies and cakes, is of much value. The literature contains a little data covering such products and official analysts as well as plant chemists, are often at a loss in determining their legality and suitability for use.

"What, for instance," asks Miss Vance, "is the legal status of a so-called lemon pie filling sold as 'Dry-pie-filling' in the form of a yellowish white powder with a faint lemon odor and which a qualitative examination shows to consist chiefly of

cornstarch, sugar, gelatine and citric acid, colored with a coal tar dye and containing, little, if any, egg?" And, with Miss Vance, I ask, on behalf of the baking industry and every lover of lemon pies, what sort of a pie would that sort of a pie be?

May I supplement the data furnished by federal and state reports by briefly referring to the work of the laboratories of The American Institute of Baking, where one of our important projects is the registration of approved products for the baker's use. I have always felt that some sort of certification of quality and correct representation would be helpful to industry. Of course, such representations are no part of any regulatory work. We cannot look to states or to Washington for approval of formulas. While the Bureau of Standards does test and register thermometers and instruments of precision, no plan has yet been devised by which a manufacturer of jelly can have his products approved and listed. It would be of great assistance to smaller manufacturers if such a plan were practicable for he would then be able to purchase materials of known and tested purity.

Institute Registration

Since there is no such system of registration the Institute has for several years past analyzed and registered certain materials which after a critical study have been found to answer every demand of legislation as to standards of purity and honest representation. In the course of our work we have registered 114 products used by bakers. Sixty-one shortenings have been registered, including lard, oleomargarines, hydrogenated products and cottonseed oils; 11 malt syrups, 18 milks, dry and condensed, and including both skimmed and whole milks, and a number of other products of varied character, such as malt, flour, trough grease and pan oils, baking powder and yeast food.

But while we have found most articles submitted for registration all that they should be we have refused registration to a number of products which not only failed to measure up to our requirements for performance but which, in our opinion, were also in violation of the food laws. May I refer to several of these unregistered products, which have been offered and no doubt sold to bakers who do not look beyond the representation of the salesman for evidence of usefulness and quality.

For much as we dislike to admit it, we have not yet reached the place in our developing work where the buyer has learned the value of laboratory control of raw materials or has been taught the value of official laboratories in guiding him in the purchase of his ingredients. If that were the case shortenings would not be offered him which were crude mixtures of fats, glucose, water, glycerine, salt and some easily hydrolyzed starch; alum would not go into his shop in the guise of cake shortening; he would not be offered condensed milks as whole milks when they were in fact made from partially skimmed milk; nor would useless and fraudulent products appear on the market as bakers' malt which instead of being dehydrated malts were in fact mixtures of dried malt extracts with cane sugar, colored with aniline dye.

There seems to be no end to the ingenuity of compounders of new and amazing helps for the baker. New shortenings, new yeast foods, new types of flours with extraordinary ability to increase absorption of water in the dough; new ingredients for preventing the staling of bread; new forms of old materials are recommended for their superior qualities as bread improvers. None of us would put a single stone in the path of real progress toward the production of better food.

And at the same time we would urge the careful study of every new method, every new ingredient, every new revolutionizing discovery with three questions in mind: Is it in compliance with law? Is it in the interest of better nutrition? Is it honestly described and sold? A fourth query might well be made: Is it worth the price? For many a product is sold by sheer power of salesmanship which, while possessing real merit does not justify its cost. And now, after picturing in this sketchy way the need for a better knowledge of every ingredient which is used in preparing food, I ask you, "is it possible to arrange this coming year for a critical study of the whole range of baking materials which are certainly of fundamental importance to at least four groups of citizens: consumers, food officials, the baking industry, and manufacturers and jobbers of the products in question?"

Items To Investigate

I would list the subjects for investigation as follows:

- (1) Milks, dry and condensed.
- (2) Malt syrups and other malt products.
- (3) Cream fillings, whip powders and icings, and colors.
- (4) Spices, extracts, supplied the bakery trade.
- (5) Fruit products, such as jellies, etc., used in cake making, jelly rolls, etc.
- (6) Canned and evaporated fruits used by pie bakers.
- (7) Raisins and other dried fruits.
- (8) Walnuts, almonds and other nut meats.
- (9) Eggs, egg white and yolk, frozen and dried.

It is, of course, evident that many of the materials referred to are unstandardized and for the most part poorly defined. Even the manufacturing and jobbing trade is often at a loss to know how to label their products, and the baker who used them has no more information as

to their quality than that given by the salesman. He buys and uses whipping powders, toppings and fillers without the slightest knowledge of their composition, but his ignorance is a trivial thing when compared with that of the ultimate consumer.

High Cost of Ignorance

Such a situation is not a wholesome one. The consumption of baked goods is reduced because of the growing desire for a knowledge of the facts about food, and the paucity of such information. Every dinner table is a forum for the discussion of vitamins, calories, mineral salts, and fat forming qualities. Even the children want to know something about the real worth of their food. This new interest in food follows naturally the spread of the knowledge of nutrition in the schools, and whether we are food chemists, food manufacturers, or dealers in raw materials and finished products, we must be prepared to answer the inquiring group which three times a day fills 25,000,000 dining rooms.

The old saying, "What you don't know won't hurt you," is no part of the philosophy of modern food manufacture. It has been supplanted by our early slogan "Let the label tell the truth," and by Welcome signs over the factory door, while modern food advertising is instructive and interesting.

So it is that the baking industry gladly comes to you for help, help in establishing desirable standards for the materials it uses, help in eliminating adulterated materials from its storerooms, help in giving every consumer the feeling of confidence which lies at the basis of the old nutritional axiom, "A good digestion waits on appetite, and health on both."

We cannot, of course, even guess the direction our investigational roads may take us. We can only hope that they will

lead us out of the maze of doubt and ignorance which now checks our progress.

In Chicago there is today, I am informed, in the custody of the U. S. Marshall, one lot of 27 tons of frozen eggs in a state of putridity and decomposition. But a short time ago a large consignment of canned blueberries was ordered destroyed because of gross adulteration with worms. If federal inspectors had not detected these illegal products, they would before this have gone into consumption in cakes and pies.

It is a good thing for consumer and baker alike to be assured that their baked foods are wholesome because federal inspectors are vigilant in their behalf. It will be an added assurance when they know that in every state inspectors and chemists are concerned over the quality of baking materials and are co-operating with the baking industry in establishing standards of purity and assisting the elimination of every form of fraud and substitution from the products of the bakery.

From Graf of Bozeman

We have electrified our bakery and have decided to electrify our contact with the baking industry as well, so please set us down as members, and we will stay with you this time for good. It is possible that when our boy graduates from High School next year we will send him down to your Institute school. We have been told your service in testing bread is good and would like to take advantage of it. Please tell us how to ship loaves to you.

How Oregon bakers realize that all phases of public life react upon them, and affect their welfare, is indicated by the fact that they appointed committees on legislation, advertising, toast campaign and labor.

Fore and Aft

ONE year ago this magazine printed a story from the extreme outer trenches of the modern woman's advance into the modern world. The story was that of a Y. W. C. A. worker who found her New York City school for bread baking could not lure a single girl student.

At the same time this Y. W. C. A. teacher found her school for teaching beauty secrets was crowded to the doors. She drew a conclusion—that "the best the grandfather of tomorrow could have to remember would be the delightful cafeterias to which his wife led him in their younger days." He could never, she concluded, call up to his children's minds the kind of bread their mother used to bake!

This philosophic Y. W. C. A. worker even said a kind word for the beauty classes in her school. She insisted that the modern girl was aiming at higher pay through neater appearance and that her course through the beauty school was not mere vanity but represented a real attack upon the pay envelope in modern industry.

From that view of the extreme advance, we must turn to a word from the rear guard. Down in Indiana, where the Indiana poets thrive, lives a lover of home-baked bread. His home is at Trevlac.

All who have to deal with wheat and wheat foods will be interested in the view of a Hoosier, as it is one the baking industry has thrived upon overcoming through the whole period of woman's progress out of the kitchen.

In this period remarkable inventions have put steel arms to work that mix bread and leave no backache in the home. But just as the poet Wordsworth bemoaned the coming of the railroad trains, "to depoetize the landscape," so does our Indiana poet bemoan the freedom of the woman from kitchen work.

It happens that the baking industry, when it found itself as an organized whole,

put Dr. H. E. Barnard to work as the spokesman of the whole industry. Dr. Barnard appeared before the scientists from America's laboratories at a convention of the American Chemical Society at New Haven, Conn. He told these scientists of the way science had taken over the baking industry, and now commanded its processes.

Literary Digest's View

The *Literary Digest*, alert watchman for new news of the world, found Dr. Barnard's paper worth reprinting in part. It glorified bakers' bread, and stirred the laird of Trevlac, down at Hickory Hill, Indiana, to this strain of comment:

"It is mighty good publicity for you to break into the *Literary Digest*. Of course you and I know it is all bunk about baker's bread being as good as home made. But your work helps the sale of baker's bread and so you do your job."

More Dough Clubs

From Chicago the idea of organizing dough clubs is spreading over the country. And Chicago in turn took its idea from the success of the New York Bakers Club.

"The Dough Club," writes a miller from Wichita, Kansas, "is needed down here to iron out a great many difficulties between various interests. There are hard feelings. There ought to be a general reconciliation among people who have cherished ill will towards one another for a long, long time. Write us if the Dough Club idea would work in such a case."

The answer that was sent read: "Yes, if you don't try to make it work." The fundamental idea behind the Dough Club organizations is that of good fellowship, and sociability. As one speaker to the Chicago club put it, the tendency of human beings is to pounce upon folks they consider to be strangers and to be weak.

There is a certain gloating satisfaction in making some man "cool his heels," out with the office boy. But after one has broken bread with a man that attitude of stranger to stranger becomes modified. It is warmed by the fires of friendship that only burn where men are well acquainted.

"If your millers, bakers, supplies men, and machinery men all get together and play together at luncheons where much fun is made and little serious discussion occurs, the hard feelings will disappear."

The importance of playing together and jesting together is too often underestimated by men who consider such things mere distractions from business. Dough Clubs are to pass men from the competitive to the co-operative state of mind—with good will and confidence in the place of the old ill will and distrust.

"I had the pleasure of attending the meeting of the American Society of Bakery Engineers at your convention at Atlantic City and formed the most favorable impression of this very valuable organization. In fact, no one who attended this convention could help being impressed with the rapid strides of the baking industry and the high plane which it has now attained from the scientific, engineering and advertising points of view."

Washington Platt,
Merrell-Soule Company, Technical Service Dept.

I have had four bakers read the Institute's magazine for November and then mail it back to me, and it is now on its way to a fifth. Your article telling how two bakers found out that women know the best bread, should be printed as a leaflet and sent to all bakers, everywhere. Too many bakers think their customers can't tell a good loaf when they get one, and so let down on quality.

—S. I. Bagwell, Salina, Kansas.

Free Chlorine in Water

How it Affects Bread Baking When Present in the Bakery's Water Supply

By C. B. MORISON*

Research Department, American Institute of Baking

THE chlorination of public water supplies as a protective measure against typhoid and other water-borne diseases is now regarded as standard practice by health authorities and sanitarians. The reduction in the death rate from typhoid fever following chlorination has become a fact of common knowledge. The city of Chicago, during the first nine months after the complete chlorination of the water supply in 1916, reduced its death rate from typhoid fever by 72.44 per cent (1). It is therefore not surprising that chlorination has been generally recommended for the disinfection of raw waters.

The literature of chlorination from the sanitarian's viewpoint is rather expensive. Bartow and Legendre (2) have discussed the history and applications of liquid chlorine in an interesting monograph. There is, however, but scant reference in the literature to the effects of chlorinated water in fermentation industries such as baking and brewing. The writer has been unable to find any specific information on this subject in the literature of baking thus far examined, altho in conversation and correspondence with practical bakers the general opinion seems to be that the chlorination of water is detrimental to fermentation and quality bread. Many inquiries regarding the effects of chlorinated water in bread making have been received at the Institute, with complaints that when the ordinary dosage of chlorine is increased over the normal amount by the health authorities, fermentation troubles occur, with the produc-

tion of bread of undesirable characteristics, particularly of flavor and taste.

In view of such inquiries and complaints, and the apparent lack of information on the subject in the literature, an investigation was begun at the Institute on the effects of known amounts of free chlorine in water when applied under the conditions of baking tests.

Experimental

1. **Solution of chlorine.**—A solution of chlorine water was prepared by passing the washed gas generated from C. P. concentrated hydrochloric acid and potassium permanganate into distilled water. The amount of free chlorine in the solution was determined volumetrically by the usual method with potassium iodide and standard sodium thiosulfate solution. The required amount of the chlorine solution was then added to the proper volume of Chicago tap water for the required concentration of free chlorine as expressed in parts per million of water, making a correction for the amount of free chlorine in the Chicago tap water as determined colorimetrically by the *o* toluidine method (3).

2. **Formula and baking tests.**—The formula was in general, except as indicated, the usual one employed in the American Institute School of Baking as follows:

	Grams
Flour	325
Sugar	10.0
Salt	5.5
Yeast	11.0
Water according to absorption....	195.0
Shortening	6.5

* Read at Cereal Chemists' Convention at Milwaukee and reprinted by permission from Cereal Chemistry.

The flour was a Northwestern spring patent of a well known commercial brand.

	Per cent
Moisture	13.24
Ash	0.43
Protein	12.07

The doughs were mixed by hand and fermented, proofed and baked, in the fermentation cabinet, proofing cabinet, and electric ovens of the School of Baking. The bread was scored by several individuals.

3. Baking tests with chlorinated water, Series 1.—Three doughs were made with Chicago tap water containing 0.3 parts free chlorine per million as determined by the *o* tolidine method.

Average temperature of dough, 81°F.

Average total fermentation period, 140 minutes.

Average score of bread, 90.5.

Series 2.—Three doughs were made with Chicago tap water containing 1.0 part free chlorine per million. The free chlorine content of the water was increased from 0.3 to 1.0 part by the addition of the required amount of chlorine water.

Average temperature of dough, 81°F.

Average total fermentation period, 140 minutes.

Average score of bread, 90.

Series 3.—Three doughs were made with Chicago tap water containing 5.0 parts of free chlorine per million. The free chlorine content of the water was increased from 0.3 parts by the addition of the required amount of chlorine water.

Average temperature of dough, 82°F.

Average total fermentation period, 138 minutes.

Average score of bread, 89.5.

Series 4, A.—Three doughs were made as follows: (1) Chicago tap water 0.25 parts free chlorine per million; (2) Chi-

cago tap water 10 parts free chlorine per million; (3) Chicago tap water 10 parts free chlorine per million. In (2) and (3) the free chlorine content was increased from 0.25 parts by the addition of the required amount of chlorine water.

Test 1.—0.25 parts chlorine per million.

Temperature of dough, 80° F.

Total fermentation period, 133 minutes.

Score of bread, 90.5.

Test 2.—10 parts chlorine per million.

Temperature of dough, 80° F.

Total fermentation period, 133 minutes.

Score of bread, 88.

Test 3.—10 parts chlorine per million.

Temperature of dough, 80° F.

Total fermentation period, 133 minutes.

Score of bread, 88.

This series of baking tests was made by Student A, who reported that the doughs appeared to "tighten up" with water containing 10 parts free chlorine, that they had a bleached appearance, but that there was no perceptible bleaching of the crumb noticed in the bread.

The bread was scored by several individuals, independently, who gave the score of 13.5 for flavor and 18 for taste to the three loaves of bread.

This series of tests was repeated independently by Students B and C, whose results agreed well with those of A. The bread scored as follows:

	Student B	Student C
	0.30 parts chlorine per million	0.30 parts chlorine per million
Test 1	88	89.5
	10.0 parts chlorine per million	10.0 parts chlorine per million
Test 2	91	90
Test 3	91	89.5

No appreciable effect on the flavor and taste was noted, both students scoring these 14 and 18, respectively, for each of the three loaves. The volume was somewhat higher in the bread made with water containing 10 parts of free chlorine per

million. Student B reported a volume of 1850 cc. against 1800 cc. with the low chlorine content, and Student C 1825 cc. against 1800 cc. Slight variation was noted in the total time of fermentation of the three doughs, 167 minutes for 0.30 parts chlorine per million and 161 minutes for the dough containing 10 parts chlorine per million.

A fifth series of baking tests was run with Chicago tap water containing 20, 40, 80, and 100 parts free chlorine per million respectively. These amounts are so abnormal in relation to the amount of residual free chlorine in Chicago water which ranges from 0 to 0.4 parts chlorine per million that we refer to them merely as a matter of interest.

The quality of the bread made with water containing these abnormal amounts of free chlorine was surprisingly good in respect to external characteristics, but in each test the flavor and taste were characterized by a rather strong pungent aromatic quality similar to that associated with certain chlorinated products. The period of fermentation appeared to be shortened by these excessive amounts of free chlorine, but we have not sufficient data at this time for a satisfactory discussion of such effects.

In addition to the above laboratory baking tests, doughs were run on a larger scale in the Institute bakery under our shop conditions. The following experiment is reported in this connection.

There was but little difference in the quality of the bread made from the Chicago tap water containing 0.35 parts of free chlorine per million, and that made from the same water the free chlorine content of which had been increased to 5.0 parts per million. In this experiment the score of the bread was slightly higher for dough 3, containing the high amount of chlorine.

	Dough 1 Formula Water contained 0.35 parts chlorine per million	Dough 2 Formula Water contained 0.35 parts chlorine per million	Dough 3 Formula Water contained 5 parts chlorine per million
Flour	100	100	100
Water	58	58	58
Cerelose	3	3	3
Crisco	1.50	1.50	1.50
Salt	1.75	1.75	1.75
Diamalt	1.00	1.00	1.00
Arkady	0.25	0.25	0.25
Time of mixing	12 mins.	12 mins.	12 mins.
Temperature	82° F.	82° F.	82° F.
Total time of fermentation	135 mins.	120 mins.	115 mins.
Score of bread	89.0	89.5	92.0

4. **Gas Production.**—It seemed to be of interest to determine the effect of the presence of free chlorine in the 10 per cent sugar solution used in the Hayduck method for the determination of the fermentation power of yeast. A 10 per cent solution of cane sugar in distilled water was prepared, and in one portion of it an amount of chlorine water was added so that the resulting solution contained 5 parts chlorine per million. Fermentation tests were made with 400 cc. of the 10 per cent sugar solution at 30°C., and at the same time with the same amount of the sugar solution containing 5 parts of free chlorine per million. Ten grams of compressed bakers' yeast (Fleischmann's) taken from the interior portion of the cake, was used in each test. In a series of six Hayduck tests the average amount of gas collected in 72 minutes was 242 cc. for the 10 per cent cane sugar solution free from chlorine, and 244 cc. for the sugar solution containing 5 parts chlorine per million.

The sugar solutions containing chlorine had the characteristic odor after fermentation associated with chlorinated products but no evidence of free chlorine could be detected by either the starch

potassium iodide test or by o tolidine. Tests for chlorine were also negative immediately after the addition of the chlorine water to the sugar solution before connecting up with the gasometer.

A series of fermentation tests was also made after the method of Meissl, using 1 gram of yeast, 4 grams of cane sugar, and 0.5 gram each of potassium phosphate and ammonium phosphate in (1) 50 cc. of distilled water, (2) Chicago tap water containing 0.3 parts chlorine per million, and (3) Chicago tap water containing 5 parts chlorine per million. The solutions in the Meissl flasks with sulfuric acid traps were weighed and incubated for 24 hours at 30°C. At the end of this period the flasks were again weighed and the losses were as follows:

- | | |
|---|------------------|
| 1. Distilled water | Loss, 1.51 grams |
| 2. Chicago tap water, 0.30 parts
chlorine per million..... | Loss, 1.53 grams |
| 3. Chicago tap water, 5.0 parts
chlorine per million..... | Loss, 1.54 grams |

Conclusions

The results of the baking tests indicate that the presence of free chlorine in water to the extent of 5 to 10 parts per million does not appear to have a deleterious influence on bread quality. Such amounts would be from twelve to twenty-five times the maximum amount of residual chlorine that we have found in the Chicago water supply at our laboratories.

The presence of 5 parts per million of chlorine in the water used for the determination of the fermentation power of fresh yeast by the Hayduck and the Meissl methods, did not appear to decrease the rate or total volume of gas evolved in comparison with tests made at the same time and under the same conditions in which no free chlorine was present.

The writer wishes to express his appreciation of the assistance of Messrs. Walms-

ley, Jackson, Thompson, and Schneider, of the School of Baking, in conducting the baking tests.

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Carlsberg—And Here

THE father of all modern bacteriological laboratories is the Carlsberg laboratory where those giants of Microscopia, the yeasts, were pursued until their strains were listed, their way of life chartered, and the "open sesame" found to the control of flavors in fermented products through the control of the kind of yeast allowed to enter. So rich were the rewards in this laboratory—the first ever opened to study the Pasteur discoveries—that more such laboratories were built through all the world from the Rockefeller, in New York, to the newly finished buildings at Cornell and the University of Chicago.

From Carlsberg Dr. S. P. L. Sorensen came to the American Institute of Baking to participate in the dedication of our bronze bust of Louis Pasteur. After he returned to Denmark he gave an interview to the Copenhagen newspapers which was cabled to the Chicago Tribune. It stated that Dr. Sorensen had found at the American Institute of Baking "remarkable scientific methods in bread-making" which he will try to introduce into Denmark. If he succeeds he will only carry home to its parent the work of a lusty youngster of the home brood. Our Institute runs directly back to Carlsberg for the genesis of its inspiration and of its service to industry.

The Farm Bureau Federation

*Its 1924 Convention Brings Day Nearer when Wheat of America
will be Sold as a Single Crop*

FOUR or five hundred farmers, all redolent of the soil in their talk, met at the Congress Hotel, Chicago, during the first week in December. They met to talk over the marketing of wheat.

For three days these farmers complained that they had not been getting enough money for their wheat. On the fourth they passed resolutions and created a "farmer's bible for 1925" on which all officers elected at this meeting will be bound to go ahead for the next year.

This gospel as laid down by formal resolutions called for the most rapid development possible of the principle of co-operative marketing on the farms where wheat is raised.

Those present at this convention were members of the National Farm Bureau Federation. They talked wheat, and elected A. O. Bradfute as their president for next year. Mr. Bradfute explained what co-operative marketing is and how it differs from co-operative speculations. He explained that co-operative marketing brought the growers together so that in their marketing they could get the entire net profit of sales made, and need pay out only the cost of upkeep of their own marketing operations.

Some news that came into this convention ought to be of extreme interest to bakers. The news of greatest importance, as concerns the immediate future, was that the Santa Fe railroad was now ready to help the farmers with their plans. The wheat elevators of this railroad at Kansas City, it was explained, were among the largest primary elevators in the country, but they were not supported by housing arrangements that made the loading and unloading of cars very easy.

The railroad now plans, it was stated, an immediate expenditure of several million dollars to equip these elevators so that they will not only be the largest in America in capacity, but will be supported by housing facilities that will make them the fastest in the world to move grain into and out of.

This is a real modern development. Beyond it the farmers saw a day of bright promise for wheat growers in which there would be no American surplus to molest the stabilization of American prices, so long as any corner in the world would receive a cargo of American wheat.

The farmers saw in the gulf ports shipping centers through which they saved themselves from much trouble in 1924. They shipped grain from Kansas City to gulf ports and they arranged for ships in advance. Hence the grain went speedily on its way to foreign countries. With a great amount of the American surplus out of the way it was comparatively easy, spokesmen for the farmers said, "to meet the concentrating buying power of the American customers of American farmers, with a concentrating power over the wheat crop."

Rescued From Duluth

The wheat that used to lie up in Duluth through winters in which Lake Superior was frozen over was another lot of wheat the farmers had moved to their advantage. They concentrated lake boats at the task of moving this wheat down to Lake Erie ports before the 1923-24 freeze over of Lake Superior. Thus a great mountain of hold-over wheat was brought into striking distance of the European markets. It was shipped abroad as the market afforded good sales opportunities.

When it came time to count up America's reserve supply the farmers had so managed that there was no embarrassing amount on the market. They could make their prices on the basis of demand as matched against a current supply, instead of demand as matched against a hopeless surplus.

The farmers indicated that they intend to gain more and more control over the wheat crop—to merchandise more and more of it through their Grain Selling Corporation.

At Kansas City

An officer of this corporation made the farmers a speech in which he explained how the elevator companies were willing to turn over to the farmers the job of merchandising their own wheat. They turned over to the farmers their elevators at certain points, taking Class A stock for their equity. They agreed to accept cash as soon as the farmers might pay them out. This the farmers were permitted to do by buying Class B stock, the proceeds of the sale of which would go to pay the original owners of the elevators.

Some of the farmers at the meeting suspected this form of co-operation as "coming from the top down," and not growing from the bottom up. But the suspicious were overmatched by the confident and it appeared that the corporation was assured enough support to engage in extensive operations—operations broad enough in scope to bring a new factor into the wheat market as a controlling influence.

The Baker's Interest

And where does the baker come in, in relationship to this wheat selling group? If its plans fully mature the corporation will become farmer-owned and only holders of common stock will participate in its profits above a certain margin. Common stock will only be sold to "dirt farm-

ers" who actually ship grain through the corporation. They will receive profits according to the amount of wheat they send in.

Thus wheat selling will pass to the same method and the same control that now exists in raisin and orange selling. It is hardly too much to say that among the greatest bread merchandizers are the co-operative raisin growers—since they spend several millions of dollars each year just directing people to their nearest bakeries for bread made with raisins. The co-operative orange growers similarly have made groceries attractive with the banners of Sunkist brands.

These organizations have a great advantage over the bread bakers. They can take toll from wheat for advertising purposes before they remit to the growers. What an enterprize, then, they can conduct, when they are fully convinced that the only real sale of wheat is the sale for consumption, and that this sale is made by the baker in the form of baked goods.

Taking Them Young

OF TEN letters telling about shop troubles that arrived at the American Institute December 8, six revealed that the bakers were taking their winter doughs too young; one was overfermenting, and two were treating their doughs exactly right. Two complained that they had failed to get the desired oven spring. They were advised by telegraph to make the needed corrections in fermentation time. Back came letters telling that the bread responded at once to the treatment suggested, and one baker wrote that since sending his bread regularly to the Institute for study he had enjoyed "record sales—in fact, the record of our history."

This service is open to all bakers in the Association. The dues cover it. There is no extra charge.

A Historic Oven Prophecy

It was Made in 1907 by One who Asked in 1924 for Letters from Bakers as they were Like Stepping Stones to Heaven

WHEN a man spends his whole life thinking of nothing but the baking industry, and specifically of nothing but baked goods with relationship to the treatment they receive inside an oven's walls, he wins thereby, of course, a right to be remembered within the industry in perpetuity. W. H. Roberts was born June 4, 1867, in Lostwithiel, Cornwall, England. He came to Canada, and there dreamed ovens, planned ovens, built ovens, until he gained himself the familiar sobriquet of "the oven nut."

His first traveler for bread, built in Montreal, brought visitors from all over the world to see it, and the rest of his life was spent in perfecting that development. Just before he died on Nov. 2 Mr. Roberts asked for letters from his friends in the industry as they were "like stepping stones to heaven."

A baker mentioned at the Institute that a few months before he died Roberts had remarked, "I haven't slept in a bed for about a month. I've been always on the go—from one oven to another." He was a deeply religious man. Who of those who knew him will take the time to write to Baking Technology the little human side of his life as they knew it—the anecdotes and stories out of which his devoted life can be brought together as an enrichment of the Literature of Baking? A model of his first oven that traveled is at the Institute—and perhaps, if developments go on and on along the path he laid down—it will sometime rank in our Industry with the first Wright machine in aviation. It led the way to the mass production of bread on the large-factory unit.

Do readers now care to measure the

vision that was in his mind as the traveling oven evolved into a thing of brick and steel and hearth plates? At the sixth annual convention of the Canadian Bakers Association, held at the Temple Building, Toronto, August 13, 1907, Mr. Roberts made a speech that is now historic.

Dent Harrison heard it and provided the site on which the oven, then predicted, could be made a reality. Later in 1922, at another convention of Canadian bakers, Roberts made more predictions—as to an oven that could bake 6,000 loaves of bread an hour and could also handle them while proofing and cooling. Dent Harrison arose at once, in the presence of the present writer, and offered to have that oven built in his Montreal plant. In a few months, when we inquired about it, we learned that Harrison himself could not get into his plant for over two hours on the day he wrote, because of the crush of people who had come to see "the revolutionary oven at work."

"Without vision the people perish," is an old adage. The vision that ran before the plunging of his life into traveling oven service, was thus given to the Canadian bakers by Roberts in 1907:

The Modern Oven

IT is not enough for the oven builder simply to understand the way to lay bricks and bolt iron together, whether it be for a travelling, plate chain, peel, drawplate, patent peel or the old-fashioned oven, heated by wood put into the oven door, which are still being used in different countries. He should also have a knowledge of the article to be baked, also quality and space available for ovens.

When I arrived in Canada a year ago, I called on a baker who had a small bakery, turning out about 7000 loaves a week, all pan bread. He wanted an oven and was in negotiation with a firm for the same. The oven in question was 12x14 baking space. I saw at once he would have no bread room, as all space would have been occupied by the oven. I offered him an oven which was \$700 higher in price but which I knew would do his work at half the cost in fuel, and would take but a trifle over half the space. He decided upon this. I met the gentleman some months afterwards, when he had the oven working, and this is the remark he made: "On Friday night last we baked 880 loaves more with the same three men and machines in three and a half hours less time than it would have taken with the old oven, and every loaf properly baked." And, he added, "Let the trade come along, and we can handle it."

To speak of another type oven, I will mention the travelling plate oven, **which I think will one day supersede the drawplate for pan bread.** You are aware that a travelling oven is made to work at different speeds, regulated by steps and cone pulleys. Bread could be put on the 30 or 35 minute speed, and baked as it goes through, or the oven could be put on fast speed and loaded and thrown out of gear while the bread is being baked, and in a long oven you would get more heating surface and more benefit from the fuel used. Top and bottom heat is under perfect control, and in a factory where bread is made by machinery and oven it would be delivered by conveyor to bread room continuously or in batches, as is done in the present system of baking. I have been in a large factory at Christmas time, when they have been pushed for baking space, and saw baked in a travelling oven cakes from a 7 lb. weight to a small queen's cake.

These ovens are no experiment regarding their qualities, for ship's bread, pound cake and a great many other kinds of work that used to be done in Peel ovens, there is no question about getting heat required.

These ovens are made with narrow plates and small wheels running on guides on each side, also supported in centre, and can be run at any speed, at widths, from 8 ft. 6 in. down, from 24 to 50 feet long or any length to suit requirements and space available. They are fired in basement in any position, ends or side, and will burn any kind of fuel. I have no hesitation in saying that **there is a future for this type oven for handling pan bread.**

Mr. Loud Brown (Toronto): I would like to ask the cost?

Mr. Roberts: That is a matter I have had to deal with this week. I met a baker who had been offered an oven for \$650. I replied that we could not buy the materials to build an oven for that price today. The first gentleman I called on in Montreal had been offered an oven for \$350, or \$400, and when we asked him \$2,500, with a double buckstaff, steam drawplate, he thought we were away up in the moon, but that gentleman ordered one at \$2,500, and has since ordered two more. He pays 75 cents per barrel for coke, and never gets a single burnt loaf. You have had terrible objections in Toronto about short weight. You get some loaves that have black faces, and others look as though they were in consumption because when the oven is pushed it is not even in its operation. The price of a double-decked draw plate is \$2,500, double plate 10x12, double deck depending on the size. Different heights of ovens vary in price, it all depends on the size.

Mr. Harrison (Montreal): Mr. Roberts put in an oven for me, and I wish to bear out what he says. I have one of the old-

fashioned with fire inside, an old brick oven. When we opened the door when the batch was baked, I never saw the steam come out of that oven and drop off the oven door. Very few of the old fashioned ovens have steam tight dampers. As Mr. Roberts said in his paper, when he mentioned the price of his oven, I certainly thought they were in the sky, but when I saw what went into it, and how it went in, and the way it has since done the work—speaking specially about them being baked alike all over—I fully corroborate what he said about that. I remember the first night when we baked in the oven, Mr. Roberts took a loaf from the back and another from the front and changed them, and you could not pick out one from the other, they were both alike. The figures he has given here are correct, about the 880 loaves that were baked in three and one half hours less with the same help; that was at my place.

Mr. Armour's View

SOME bakers create a resentment within the ranks of their own industry by habitually absenting themselves from association meetings. Such resentments are especially acute when the absent baker is "the big man" of his territory. His absence creates the impression that he considers himself "too big" to associate with "the small fry."

Philip D. Armour has no such qualms about mingling with the grocers and butchers who retail his company's meat. He recognizes their function as an important one in the passing of meat from stock-yard to consumer. Before a group of retailers he expressed these views on the value of a trade association,—views which are as sound and valid, as applying to our industry as to any other:

"I am glad to see in this meeting of retailers a number of women who are

the wives of members. Thus association work has made friends of those who were not even acquainted with one another before. Such associations actually cause you members to have a better opinion of one another than you had before; they create a brotherhood of commerce and a unity in carrying out sincere and honorable purposes.

"The business value of your trade association becomes apparent when it begins to branch out, to seek educational advantages, to cooperate with all factors that affect your whole industry. If this were not the right idea the biggest trade associations would not be so insistent in promoting the development of these principles.

"Good will is based mostly upon confidence and it is your business and ours to see that the public understands and believes in every factor connected with our industry. Back of every industrial success is the desire to achieve. Your association lifts you out of old ruts, brings you new ideas.

"There is occasion for serious study of merchandising, for business of today represents a survival of the fittest. Selling food is not a mere mechanical process. It requires the best thought you have and this industry looks to-day for men of courage, men of ability, men who are willing to work, who are happy in the knowledge that they are aiding their fellow men, and who know that a fair profit is absolutely essential to their ability to continue performing this service. I know that your success and ours depends on our establishing a mutual ideal of business perfection.

"Therefore we must meet together frequently and each one of us must strive to conquer within himself the spirit that gives rise to jealousy, resentment and distrust of one's neighbor."

A Western Library and Ours

MRS. N. B. VAUGHAN, principal of the Science and Industry department of the Los Angeles Public Library has started an innovation there that so far as the librarian of the American Institute of Baking knows, is unique to California. Mrs. Vaughan has drawn a draft upon the Institute of Baking for all possible material it could furnish about the science of bread making. She has collected material from other sources.

And having this material in her possession Mrs. Vaughan did not hide that bit of news under a bushel. She circularized the baking industry's members in Los Angeles with this message:

USE YOUR LIBRARY

How the Los Angeles Public Library
Can Serve the Baking Industry.

The Institute Library was able to respond with much material, which has gone to Los Angeles. But how about the bakers nearer at home? How many of them know what the Institute library has for them? It is the largest library on fermentation and bakery problems in general in the world. Every little while some baker or baking student "wakes up" to the service the library can render and then expresses astonishment that the librarian has accomplished so much as she has.

Over a hundred periodicals, some weekly, some semi-monthly, some monthly, many house-organs and catalogs are listed regularly, all of which are referred to those members on the staff that would be most interested. All laws pertaining to the baking industry are clipped or copied and kept in a separate book, articles on bakery management, on costs, production, bread manufacture, flour and bread consumption, bakery chemistry, economics and many other subjects are clipped from

duplicate copies of periodicals, or referred to on classification cards. Several thousand reference cards are on file, and much of the information in the information files, which fill 17 legal sized filing drawers at the present time, can be found in no other library but the one connected with the American Institute of Baking. There are over 4,000 books in the library, most of which treat on the chemistry of fermentation and foods.

A few weeks ago a baker in Ohio was arrested for breaking the Sunday laws by baking during the prescribed hours. He asked us to send him all information we had on previous cases of this kind. We did this, and the case against him was dismissed.

A cooking school teacher asked for literature which would be useful for the library of a cooking school. References and material were sent her. A Boston university student on the chemistry of foods wished help to write a paper on bread baking on a large scale. References and material were sent him. A woman from Indiana asked for material to be used in a debate, Home Baking, vs. Bakers' Bread, for the Home Economics Club of her town. The principal of a high school in New York City wished material on bread and baking for the library, and wrote a most grateful letter in acknowledgment of what she received. A highschool girl from a small town in Illinois asked for help to write a paper on "Bread and Bread Making." One of our members in Tennessee asked for information regarding the relative value of bread, compared with other food, information comparing bread as to cost value with other foods, information concerning bread and milk as the balanced food, information comparing yeast bread and baking powder bread as to nutritive value, for a domestic science teacher in his vicinity.

The librarian of one of the largest yeast manufacturers in the U. S. requested historical material, particularly as it pertained to laws.

The librarian of the Franklin Institute in Philadelphia, Pa., asked for our Institute publications. The Franklin Institute was placed on our list for the receipt of *Baking Technology* and to receive all the reports and other material issued by the Institute from time to time.

The above shows only a part of the activities of our Library, but the librarian hopes that it will be sufficient to arouse an honest pride in the hearts of members, students and former students.

White Bread of Old

MOST of our writers on nutrition live by the data they see around them and only a few delve into the story of Yesterday on that theme. Thus modern millers are often accused of creating the public desire for white flour,—the easily digested, rich in energy portion of the wheat kernel. What will they say to this old poem—a vendor's song of the Middle Ages? It had to do with Shrove Tuesday, and was taken from an ancient volume on English customs of the Middle Ages.

Shroving, Shroving, I come to Shroving
White bread and apple pie.

I bring to Shroving

A piece of bread

A piece of cheese

A piece of fat bacon

Doughnuts and pancakes

All of your own making.

Shroving, Shroving, I come to Shroving.

Even in that ancient day the public favor for white bread as against what was then called "the bitter black bread of the poor," caused it to be especially advertised. Did the baker who came

with white bread know his public? Apparently he left his bitter black bread at home.

Milk Bread

Great credit must be given the bakers of America for improving the methods of bread-making. While some of us have criticized the modern methods of milling flour, we must be loud in our praise of the new formula for bread. The objections we have to much of the flour sold is that the mineral elements have been abstracted. It must be admitted that the bakers are catering to a public demand for a pure white product. The fault is that of the public, and it will be a long time before there is a popular demand for a different kind of bread.

—Dr. Royal S. Copeland,
U. S. Senator from New York.

Pies and Cakes—In School

WHY should teachers in the public schools having charge of school lunches, ban pies and cakes? Pies filled with apples are just as much food as any other food. Sugar and chocolate and eggs and flour in cake form are just as much food as in any other form.

Not so long ago a nutrition expert in Reading, Penn., thought she was correctly interpreting the work of her teacher, McCollum, when she refused a gift of white bread free from a baker to be fed as part of the ration of a group of undernourished children. Now she knows better. She knows that the white bread is the finest food the children could get for energy food—the carbohydrate intake the body calls for for its daily vigor. She knows that the mineral salts needed for the upkeep of the furnace within the body in which the carbohydrates of white bread are burned up into energy or fuel for the body, are to be had from many food sources more agreeable to most ap-

petites than when taken with the indigestible cellulose of the wheat berry's skin.

She knows that the true way to follow her teacher's nutrition lessons is to see that somewhere in the meal these mineral salts are provided, either in milk or butter or green growing vegetables. Many other problems than that of white bread in the diet will soon be worked out through laboratory tests. Prejudice against food in pie or cake form will perish with other foolish notions.

A Reporter-Baker

IN a stately cathedral in Washington, resting place of Woodrow Wilson, will rest the ashes of Herman H. Kohlsaas, who died in that city October 17th at the home of Herbert Hoover.

When I first knew Mr. Kohlsaas he was a master baker in Chicago. Into his first and profitable vocation he bore qualities of success, and these abided with him when he became identified with Chicago journalism and later advanced into intimacies with presidents. In those early days he told to a fellow reporter and myself as we were chatting with him in his Clark Street restaurant-bakery, this odd bit of personal history: "I was on the road selling bakery goods for my father-in-law, Mr. Blake. My rounds brought me to Indianapolis and one evening I was the social guest of one of my customers. There were others present and we were all contributing to the evening's entertainment. Now, it happened that I played the Jew's-harp. I played on that instrument and made that serve as my part of the program. One piece particularly impressed my host, and to my surprise he said, 'Kohlsaas, when I am dead and buried I wish you would play that piece over my grave.' I promptly said 'I will,' and I did. In time he died, and when I

returned to Indianapolis I went to his grave and over his dust I kept my promise and played that very tune."

No great and heroic act, this quaint performance, but the man who thus carried on had something in him to command the love and trust of others.

—Stubb Penn, in Chicago Commerce.

From a Visitor

I want you at the American Institute to know how very grateful I and my students are for your very courteous and hospitable welcome when we came from the University to study baking methods. What we saw confirmed the view that most of us have that the baking industry is destined to relieve the housewife of much arduous toil as well as to give her and her family more satisfactory products.

—Marion Talbot, dean of women,
University of Chicago.

From Spain

According to the claims made here in Barcelona, our bakers are making bread in a more scientific manner than anywhere else on earth. But some of us are not so sure. We would like to read the best books on that subject in America and see if we cannot improve conditions a little bit. Will you please send us from the American Institute what information you can?

—Caesar Santos Allen, Barcelona, Spain.

An Ideal

We are sending the Institute samples of our flour. We want you to make a baking test and send us the formula that will make the finest possible loaf of bread out of it. We would like to make the very best loaf that can be made, regardless of cost.

—Martin Baking Co., R. H. Martin,
proprietor, Lubbock, Tex.

Books for the Baking Laboratory

MODERN CEREAL CHEMISTRY, by D. W. Kent-Jones, B. Sc., F. I. C. 314 pages, with preface, by William Jago. Illustrated with graphs. The Northern Publishing Co., Ltd., Liverpool, 1924.

The English cereal chemist, like his American brother, has had no single reference text to which he could refer in search of information on the modern chemistry of flour. Kent-Jones has here made a very creditable effort to gather together from widely scattered sources the opinions and conclusions of research workers in flour chemistry and flour strength.

While written primarily for mill chemists, this text makes a welcome addition to the baking chemist's working library.

A thorough general knowledge of physics and chemistry is assumed in the reader, without which the milling or baking chemist can no longer hope to deal intelligently with hydrogen ion concentration or the colloidal theory of dough composition. In both these latter subjects much of the original technical language has been retained without rearrangement into simpler terms. On the other hand too many different topics are covered in the three hundred pages to allow more than an interesting compilation of conclusions under some of them.

Considerable space is given to summarizing the recent work on the physico-chemical processes involved in fermentation and baking, so that the discussion of colloidal chemistry and colloidal factors in flour strength furnishes a good review of that literature.

The role of enzymes in panary fermentation is summarized in terms of more recent research in that field and publications of the American Institute of Baking are freely quoted.

The miller will appreciate the common sense treatment of the vitamine question in its relation to milling, while the tables of values from careful and comprehensive analyses of flour and mill products should prove to be of value.

The chapter on bleaching and flour improvers contains a well balanced discussion of the history, use, and value of these substances.

Subjects like those of conditioning, ageing flour, and moisture in wheat and flour, are adequately treated, and the last third of the text is devoted to the more technical methods of analysis. An appendix carries the official methods of the American Association of Cereal Chemists.

L. A. R.

A baker who called at the American Institute for "some good cake recipe books" found what he wanted in Vols. I, II, and III, of "Bakers Best Sellers," printed by the Technical Department of Bakers Weekly, 45 West 45th Street, New York City.

The foreword to Vol. III of this excellent series for any bakeshop calls attention to a successful sweet-good line in these words: "Remember the human palate constantly craves a change, and to meet this desire the wise retail baker will constantly have a great variety of baked products to offer to his trade. He must remember always that variety is the only true spice of life."

Abstracts of Technical Articles

Selected for Baking Technology from Chemical Abstracts

Diet in relation to reproduction and rearing of young. L. T. Anderegg. J. Biol. Chem. 59, 587-99 (1924).—Although the mortality of the young is very high, normal growth and reproduction, even to the fourth generation, may be obtained with rats on a diet in which whole milk powder is the sole source of protein and vitamins. To obtain optimum growth, the proportions of protein, fat and salts must be kept within certain limits. Diets high in protein and low in fat are detrimental to the rearing of the young. "The data show that it is unnecessary to assume the existence of a new vitamin for reproduction." Cf. Evans and Bishop, C. A. 17, 1045, 3699; Smith and Carey, C. A. 18, 706.

I. Greenwald.

Digestibility of raw starches and carbohydrates.

C. F. Langworthy and Alice T. Merrill. U. S. Dept. Agr., Bull. 1213, 1-15 (1924).—In digestion expts. with women it was shown that pure raw starch from corn, wheat and rice flours was completely digested. Raw potato starch gave coefficients of digestibility varying from 49 to 100% with an average of 81%. Raw patent flour and raw farina gave in all cases a coefficient of digestibility of 100% for the starch. The average digestibility of the carbohydrate in raw graham flour was 97% and in raw corn meal 99%.

A carbohydrate characteristic of the endosperm of raw waxy maize, a substance reacting red with I, gave coefficient of digestibility of 97%.

W. H. Ross.

Factors influencing the keeping qualities of whole milk powders. L. S. Palmer, C. D. Dahle and H. Macy. Minnesota Agr. Expt. Sta., Ann. Rept. 1922, 40pp.—Moisture in powders increases the oxidative and hydrolytic decomposition. Room temperature offers best storage conditions for milk powders when sealed in tin cans in temperate climates but cold storage is necessary in tropical temperature.

J. J. Skinner.

Viscosity as a measure of gluten quality. R. A. Gortner. Cereal Chem. 1, 75-81 (1924).—Abs. viscosities of flour-water suspensions yield results which may be wrongly interpreted because the viscosity is the resultant of 2 factors, the quantity and the quality of the glutenin present in wheat flour. A method is described for determining a constant which is apparently characteristic of the quality of glutenin present in wheat flour.

Ruth Buchanan.

Detection of persulfate in flour, and a recent bleaching agent for flour. J. Miller, J. Soc. Chem. Ind. 43, 239-40T (1924).—A few grains of persulfate contg. flour are placed on a microscopic slide and immersed in 10% KI for 10 sec. Within a minute brown spots of I liberated by the per-salt begin to show. Half an ounce of persulfate per sack of flour may be detected in this way. The same reagent is used for detection of benzoyl peroxide but the reaction is slow and heating is recommended.

F. A. Cajori.

Determination of moisture in flour. L. C. Mitchell and Samuel Alfend. J. Assoc. Official Agr. Chem. 8, 76-9 (1924).—When flour is dried in vacuo in loosely covered dishes higher and more uniform results are obtained than when it is dried in open dishes. This is attributed to exposure of the contents of the uncovered dishes to the air from the time the oven is opened until the cover is put on to let cool.

A. Papineau-Couture

Effect of storage on baking quality of common and durum wheats. C. E. Mangels, Cereal Chem. 1, 168-78 (1924).—A study is given of the effect of storage on loaf volume of bread

made from common and durum wheats. Warm storage is more detrimental to flour quality than cool storage. After 11 months' storage all lots of flour showed some deterioration, but the durum flours showed relatively greater deterioration than the common-wheat flours.

Ruth Buchanan.

Studies on the metabolism of obesity. I. The relation between food intake and body weight in some obese persons. Solomon Strouse and M. Dye. Arch. Intern. Med. 34, 267-74 (1924); cf. C. A. 18, 2741.—A review of the literature and observations on the food intake of a few stout individuals indicate that certain obese individuals may maintain body weight on diets that are below their calculated energy requirements. **II. Basal metabolism.** Solomon Strouse, C. C. Wang and M. Dye. Ibid 275-81.—Eleven determinations of basal metabolism in 6 normal persons, 17 in 9 who were underweight and 33 in 17 who were overweight, indicate that neither excessive underweight nor excessive overweight is associated with a constant, pronounced change in basal metabolism.

J. Greenwald.

The biological value for maintenance and growth of the proteins of whole wheat, eggs and pork. H. H. Mitchell and G. G. Carman. J. Biol. Chem. 60, 613-20 (1924).—The average biological values found for the proteins (NX 6.25) of eggs, pork and wheat at an 8% level of intake were, respectively 93, 74, and 67. The differences indicated by these averages are of high significance since they were obtained for each of the 9 rats used in the experiment with 1 exception. Though the biological value of its total N is thus not much greater than that of the N of whole wheat, lean pork must still be ranked among the best protein foods because of its high "net protein" value. Based on average determinations of the crude protein content of these foods, and the % losses in digestion and metabolism indicated by the results of the experiments, the content of net protein of egg is 12.5%, of lean pork 14.6%, and of whole wheat, 7.6%. The order in which different foods are tested for their protein value in nutrition has no appreciable effect on the results obtained. In particular the testing of a food after a period of N depletion of the experimental animal does not tend to increase the biological value of its protein.

A. P. Lothrop.

Two Bakers — A Single Flour

HOW would you like to receive a car of flour that seemed to you no good—no good positively. So no good, in fact, that you wired the miller that sold it to you to come and take it away, and either send you a new car or else lose all your trade forevermore?

How would you like to see the miller do just that—haul all that no good flour out and haul in another carload—and smile while he did it? And then turn right around and put the flour you had spurned into the hands of another baker, only to see your “stung” friend make up finer loaves out of it than you had ever turned out in all the years of your baking career?

A baker in a town we might mention did just that with a carload of flour. No, we are not going to mention the town or the miller or the baker. But the principals in this little drama of improving relationships between miller and baker will recognize all of the facts as here set down. The baker of the first part baked up a few samples of his new flour and made the wires fairly sizzle with protests. The new car of flour was duly sent in, and no questions asked—of that baker.

Instead, the questions were asked of the American Institute of Baking. William Walmsley, in charge of shop operations at our school, asked for a number of 25-pound samples. He received them, taken at random from sacks of the rejected flour. With these samples he made an odd test. It was a secret test in which the man who made it was totally ignorant of what he was up to. This man was chosen because he came from a yeast company as a student and therefore was not skilled in detecting mill brands from flour samples.

He was given the flour under the name of “Primrose,” and told to put it through in the day’s regular shop run. This green student, who knew nothing whatever about baking three months ago, brought forth loaves of bread which were later marked as “Excellent.” They were pound and a half round-top loaves, and were among the finest that have ever come out of the Institute ovens. It was all in handling the flour. The fermentation time of the baker that rejected them had been “away off.”

What the lad, who was just three months away from his greenhorn days, did was to produce a large, bold loaf of excellent color, grain, texture and flavor. When his work had been looked over by the class as a whole, more samples of the flour were turned over to other students. This time three of the students came from bakeries which had been handling this flour regularly. They produced loaves fully as good as the first student. Then they were told that this was a “no-good flour,” and all of the messages from the irate baker who had rejected it were read to them.

It proved to be an object lesson in the folly of taking the “guess so” method at arriving at truth. In the American Institute School there is no such thing as “guess so” or “just about” in any baking operation. The student is taught first to find out just what kind of flour he has—from a laboratory test. And then to shape his formula and his operations to best bring out its possibilities. It is safe to say that no graduate of this school will ever send irate telegrams to a flour mill when the real trouble is in his shop and “is his own darn fault.”

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